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Rural Credit System for Agriculture and Rural Poor in Tamil Nadu

Some Aspects and Facets of Inflation in India

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EDITORIAL - SOME HIGHLIGHTS

I. General Economic Scene

State

Weather and Prices

There is a Tamil tradition that if the monsoon sets in on New Moon's day, it will be a good and plentiful monsoon. The North East monsoon did set in on New Moon's Day — of October 17, which made it start on time and the fortnights record in October was very good in terms of heavy and continuous rains everywhere in the state — in the coastal areas covering Madras down to Thanjavur, the Delta areas, Madurai and Kovai regions, Quaid-e-Milleth, Salem etc. This was on top of a satisfactory south west monsoon running from June 1 to September 30, under which Pondy and Chengai Anna record a 2[illegible] per cent excess, 8 districts record normal ranging from + 19 to —19 per cent, 9 districts record a deficiency ranging from —20 per cent to —59 per cent and only 2 districts, Tirunelveli and Kanyakumari recording scanty rainfall of —67 per cent to —72 per cent. The active North East monsoon looks as if it will not only add to the water resources for districts which had a normal south west monsoon, but also compensate the districts which recorded deficient or scanty rains during that period. On the price situation in the state as reported by CSO's February 1990 issue, all three indices — consumer prices for industrial workers, agricultural labourers and urban non under employees do not show any substantial movement in December 1990 over that of November reported in Vol. XX No. 7 p. 310 — but for the nine months, April-December 1990 the index for industrial workers shows a rise of 6 per cent for agricultural labourers a rise of 5 per cent and a very small 2 per cent, rise for urban non manual employees — the disparity between the inflation imposed on industrial and agricultural

workers being about three times that on urban non manual èmployees.

Power

The crucial development input of power continued to face in October the crisis referred to in the last issue of the Bulletin which led to the imposition in early October of a 30 per cent cut on HT units with a permitted demand of about 120 kg on both demand and energy, while other HT industries like oxygen plants, freezing plants and cold storage of sea food industries with a similar demand will be subject to a 15 per cent cut. The combination of factors which brought this crisis situation referred to in the last issue of the Bulletin comprising a steep fall in coal supply from the coal mines of West Bengal and Orissa a not very satisfactory hydel reservoirs position, the sharp decline the power contribution from Ramagundam, continued in October to which the accident of the fire in the Kadamparai hydel station — one of three such under ground stations in the country — which was extinguished after 4 days during which 2 of the 12 transformers were burnt, added to the power crunch. There was some good and fast short term remedial action taken by the Tamil Nadu Electricity Board and the state government which avoided a serious breakdown in power supply. But the problem is a long term continuing one and for this some long term policies and plan are necessary which go beyond the competence of individual states. The long term perspectives are grim as by the time of the century 200,000 MW will have to be installed. This can be done if non conventional energy sources are harnessed. This requires planning at the National level (and execution at the state level) through which 300,000 MW can be added (10,000 MW from wind, 100,000 MW from tides, 30,000 MW from bio gas, 30,000 from bio mass, 112,500 MW through energy plantation, plus the solar energy contribution which has been computed at 20,000 times the country's requirement at the high rate of economic growth). Unless these sources are planned for now and the needed investment in R&D and commercialisation made, there will be a continuation of the present lumping in meeting on a day to day the power crisis and crunches. Both the National and State programmes of non conventional energy raise serious questions as to whether they are being taken seriously. (The October seminar on wind energy in Madras and the Department of non conventional energy's proposal for a budget of Rs. 5000 crores during the VIII Plan for the development of the above form of non conventional energy are small steps in the direction indicated).

For the country, the power situation showed some improvement with the good south west monsoon filling hydel reservoirs, though the VIII Plan proposal to cut back on hydel investment is a retrograde step. The perennial short supply of power experienced by Karnataka and West Bengal eased, and Andhra Pradesh raised power tariff rates by 10 to 20 per cent because of the increase in input costs for power supply. This will be followed by other states and the cascading effect of these increases on the rest of the economy will soon become evident. Among the long term plans being formulated to deal with power shortage is the package that has been developed for demand management and energy conservation, which will deal with the demand side which has so far been neglected. Another project of long term significance is ONGC's

underground gas storage scheme which is to start in the eastern region by 1992. This action is on the supply side. These two demand and supply policies are a heartening beginning if they are followed up by concrete action.

Water

In the water area, in October some four issues are to be noted. First due to the good North East monsoon, the drinking water situation in Madras is eased, with the Red Hills, Cholavaram, and Poondi holding about double the water in the last week at 1600 mcft by October 31—which is one third of the Red Hill reservoir. This does not mean that in the long term Madras drinking water problems is anywhere near a settlement. The Krishna waters, the first stage of which will be ready in 1993, are essential. Second the Mettur storage is once more inadequate and the government has appealed to Karnataka for the release of 20 tmcft which has been turned down. And taking advantage of the good rains in Thanjavur, Mettur has been closed as a temporary measure. But here again there is the need for a long term restructuration of paddy cultivation in the Cauvery delta, of which there is little sign. Third with the drought of the past 3 seasons and the heavy drawal of under ground water, the water table in the state particularly in the paddy growing area, is falling fast. This is facing a reduction in paddy acreage which has fallen by 25 per cent (from 24 lakh hectares to 20 lakh hectares). But this should be a planned effort and not be the result of the force majeure as at present. Fourth the rains have resulted in copious flows into irrigation tanks —6930 PWD tanks and 15000 tanks in Thanjavur, Madurai, Chengai Anna, Tirunelveli and Kanyakumari as well as the systems tanks fed by rivers. Here there is a problem in that, the inflows into the tanks would have been more plentiful if there were not encroachments in supply channels and tank beds, similar to the encroachments in the catchment areas of Red Hills (see Vol. XV p. 257 & Vol. XIX p. 587) Another programme which needs attention is the extension of dry farming and the inputs, research and credit, that it calls for. An important programme under way is the development of two watershed programmes in two districts, and one important point here is the association of the people through their local elected bodies in the project. The project is also attracting inter departmental cooperation which is not common—as between forestry, agriculture, engineering, horticulture and animal husbandry specialists to make a success of the water shed programme. Here again this should not be a forced development but should aim spontaneously. That may be the lesson to be learnt.

Transport

The Pallavan Transport Service in Madras has effected a four fold reduction on some of its lines, increasing four fold the waiting period for passengers for their buses. Two factors are alleged for this serious reduction in public transport. First the 10 per cent cut in fuel supply referred to in the last issue and the second is that the occasion is being used to reduce sharply the loss incurring services. This whole area of public transport needs review by the Planning Commission — both union and state. If public transport is a priority over individual passenger cars, then the first reduction

should be in the latter through a system of fuel rationising on motorists and not through reduction of public transport services which should have absolute priority. On the loss making services, there is need for a cost review to identify and correct the causes for the losses.

Welfare

The Rural Debt Relief scheme is being extended as reported in the last issue and is now being extended to those engaged in agricultural and allied activities in non rural areas. So the scheme now covers besides cultivators, weavers, artisans, in non rural areas and fishermen engaged in marine and inland fisheries. This is a priority scheme to give relief to the poor — only it should be made sure that the beneficiaries are the poor and not the non poor and the scheme should not be extended in this piece meal and ad hoc fashion. On the welfare side, while state government employers are being compensated by an additional dearness allowance from July 1 to compensate the rise in prices, the quite unjustifiable strike by the well and highly paid public sector officers in oil, coal, steel and other public sector industries for a further rise in their involements caused a sharp rise in prices, starting with petrol products and so hit the common man. The poor are the first to feel the impact of a rise in prices, and in this case there were the non poor living above the poverty line who have faced serious hardships. The revolt of public opinion against the strike by the highly paid officials brought the strike to an early end. But the disruption caused was lasting and serious. The extension of free electricity supply from 1 lakh small farmers to 11.5 lakh farmers (large and medium farmers) costing the state an additional Rs. 30 crores raises serious question of economy (where is the money to come from at this time of resource scarcity in the state) and of equity as only large and medium farmers get this benetit. This will worsen TNEB's finances. There is also the problem of pumpset owners using diesel not having this concession.

National

Plan

October has brought into the open several assumptions on which the VIII Plan is based and the viability of these assumptions. The Plan assumes that deficit financing will be around Rs. 30,000 crores or 5 per cent of the total Plan outlay against the projected 7.8 per cent and the actual of 15.1 per cent of the VIII Plan. Will the VIII Plan assumption hold? Will the three sectors which contributed to the high VIII Plan deficit be curbed in the VII Plan — the fall of the Public sector enterprises contribution by 40 per cent (which will continue and worsen if present trends of public sector savings are an indication), the decline in ARM by about 30 per cent, which also is persisting now, and balance from current revenues which was projected at —2.9 per cent of the total outlay increasing to —6.5 per cent, which the Tamil Nadu decision on granting free electricity to large and medium farmers shows no chance of reversal. In fact, the choice of increasing the deficit and so adding to inflation, or reducing the VIII Plan growth rate so that the government can live within its resources is already staring us it in the face. A related issue is the VIII Plan allocation of about 50 per cent of the total Plan outlay to the

agricultural and rural sector. With the resources constraint, this can be done if there is a reduction in the allocations to the core sectors — steel, power, railways etc. and limiting the Plan by and large to completing the existing projects. This will have a noticeable effect on the Plan and its development. A third issue is the Rs. 3000 crores additional foreign exchange which will be needed to meet the higher cost of petro product imports (because of the gulf crisis), and the near empty foreign exchange reserves situation against which the Planning Commission envisages a modest build up of Rs. 2200 crores of the foreign exchange reserve in the eighth plan. This will call for over a fifty per cent reduction in the balance of payment deficit (from 2.4 per cent of GDP to 1 per cent during the Eighth Plan). There is no items of the balance of payments schedule which assures this reduction as of now. October saw a meeting of the National Development Council approved a revised modified Gadgil formula for allocating union a plan assistance which apart from not satisfying many states (which is natural with any overall formula) makes only minor changes, not giving social indicators like infant mortality its weightage as proposed by the Planning Commission, and substituting a reduced 5 per cent instead of the previous 10 per cent for fiscal management which has been rightly substituted for tax effort. Whether the decision to reduce the weightage to population to accommodate the increased weightage to special problems was wise remains to be seen. A final recurrent issue which is also being faced is the financing decentralisation through shifting the centrally sponsored schemes to the states which total over Rs. 20,000 crores. The Union ministries are totally opposed to this Planning Commission proposal, which points to the inefficient use of resources under the present set up by the ministries. For instance Rs. 5713 crores are spent by the union ministries on drought in addition to the DPAP and DPP projects. Why should not this sum be merged with state Plans. This is all the more needed as the first year (1990-91) plan shows a 37 per cent share of the total Plan outlay, which with the new emphasis on agriculture and rural activities (all of which are the state's responsibility) should be nearer 50 per cent. The case for transferring all centrally sponsored projects on economic growth are clear and the proposal to do this by phases and in a fraction manner should be resisted.

Prices

The September inflation rate was similar to that of August analysed in the last issue of the Bulletin at 0.5 per cent on a point to point basis, the whole saled price index standing at 180.9 for the week ending September 29. On a 12 months basis, the point to point inflation rate was 7.9 per cent. Several factors are keeping the inflation rate down, the plentiful south west monsoon and the good agricultural crop expected and the deflationary effect of the gulf crisis. But in mid October the government raised petroleum product prices by 25 per cent. Was this an effort to raise more resources because along with 7 per cent surcharge on corporate tax (which will raise this year Rs. 52.6 crores from 324 private sector companies) there will be an additional Rs. 2700 crores accruing as government revenue. If the government also has in mind that the effect of this hike is to reduce petroleum products demand and consumption, this will not occur.

Such reduction will require rationing of petrol products, which even allowing for black marketing, will still cut its consumption. The cascading effect of the higher petroleum prices will be felt in the coming months and for the year 1970-71 could result in an inflation rate of 12-13 per cent. The first effect of the rise in petro product prices will be felt by industrial consumers whose petro based products constitute a substantial portion (followed by pumpset owners) which could raise the prices of their finished products by around 10 per cent.

Gulf Crisis, Stock Market and Others

Some of the earlier notes on raising taxes, should be seen in an official computation that the gulf crisis involving higher prices for crude and petro products, reduced flow of remittances from NRIs, decrease in exports to West Asian countries, as well as to industrial countries, and cost of evacuation from the Gulf will involve a short fall of Rs. 5500 crores in foreign exchange. One direct result of this is the approach to IMF for a large $4-5 billion loan. (Actually an IMF team is now in the country discussing this issue. This loan will involve very severe conditionalities for which we should be prepared. Another consequence is the widening of the budget deficit, which was hinted at earlier. The deficit for the period April-September is reported at Rs. 8931 crores, which may go up to Rs. 11,000 crores, given the increasing demand for resources by the ministries. Would the busy season credit policy involving disciplinary measures for borrowers in the form of commitment charges unutilised credit and penal interest on excess book debt finance, the broadening of the call money market, the creation of new categories of bank deposits of 3 years and above at 11 per cent interest rate-make an impact on the deficit, money market and inflation). In the stock market which witnessed an unprecedented boom in September and early October, in which the mutual funds of the banks played a major part, the problem of disciplining operators is increasing. In the short run, there is a cross flow of funds between the primary and secondary market, with money chasing higher and higher returns, in the long run there is a gradual shifting of savings from bank deposits into equity. The question of a free stock market which will encourage a flow of funds into more remunerative channels raises question about their effect on the economy to which no answer can be given at present.

Economy

The Economy shape in October has been reviewed in earlier sections as facing a growing deficit, a sharp inflationary spiral, as needing some physical controls on demand in addition to the higher taxes, and as faced with high deficit of round about Rs. 10,000 crores, and a balance of payments imbalance and the exhausted foreign exchange reserves, which is leading to increasing international commercial market loans (SBI alone has borrowed $ 3.1 billion) and the start of negotiations with IMF for a massive loan. In this connection it is to be regretted that the Finance Minister has gone back on his proposal to set a limit to union borrowing under Article 292, as proposed by him at the Budget session (See Vol. XX P 230—). As part of the need to cut demand for physical products and reduce state subsidies on

them, will the NCAER proposal to reduce PDS gain distribution by 4 million tonnes by eliminating the upper strata of households from its purview help? It will reduce the subsidy element but the amount of the grains in the market will be unaffected, if the 4 million tonnes is placed on the open market. The Inter States Council provided in Article 263 of the constitution which has remained dormant since it was adopted in 1950 was at long last launched. Being the first meeting, it was much more a case of the state governments getting their long suppressed views off their chest which they did, the actual achievement being a decision on the consignment tax on vehicles on which the finance minister is to present a bill at the next session of parliament. The effect of the gulf crisis on the economy and the Union and states was very fully debated with a broad agreement in the seriousness of its impact and the measures for its alleviation. Two rather important proposals have been floated but whether they will become effective as operational issues remains to be seen. One is the proposal to amend the urban ceiling Act which has become outdated and on which the states are enjoined to reach consensus for its modification. This as of now is a non starter. The other is a proposal by the prime minister to make 40 per cent of seats in parliament and state legislatures reserved for the poor. This has been put forward at this stage for debate and is likely to remain at that. To the list of sick sectors, the Banking sector has been added by the Reserve Bank which has in particular identified 8 commercial banks whose profits have declined and who for the first time show loss. This crisis is serious for the economy and has been noted by the World Bank which has proposed some corrective measures for immediate application. The other curious development is the position of the sugar industry where India has emerged as the largest production of 110 lakhs in 1990-91, along side of spreading sickness seen in the increasing number of units closing down due to financial difficulties. This points to the need for restructuring the industry and not merely licensing new units and expanding existing ones, which the recent guidelines promote.

Industry

The industrial index for June shows an increase of 12.7 per cent compared to June 1989 making the average for the first quarter a high 13 per cent. (The Industry minister on October 30 reported to the parliamentary consultative committee that the growth rate from April to July was 12.9 per cent, with manufactures recording a high 14.7 per cent). But all this is based on a very low base in the first quarter of 1989 where the index rise was 1.8 per cent (See Vol XX p. 5) and so the statistics should not be taken too seriously. This is particularly so because the industries showing sharp increase are electrical machinery, chemical and basic metals which have to be judged on an annual basis while despite the plentiful foodgrains and products, food shows a decline. On the other hand, the only beneficiary of the Gulf crisis is the jute industry which because of the shortfall and rise in costs of petroleum based products of which synthetics is one, and along with the bumber jute crop, the jute industry can now use the IFCI modernisation fund to the full and pay its ways for the use of the funds. On the other hand the government must help this process by allowing duty free imports of machinery which

the modernisation programme involves. Can the foreign exchange outgo be made up by increased jute goods exports which can be transformed to meet the sophisticated demands abroad ? Per contra, the naphtha cracking projects such as the Rs. 3000 crore Haldia project have become less economical and cheaper alternatives must be developed. To some extent, this also explains the 2.3 million demand supply gap in the case of phosphatic and nitrogenous fertilizers though the major short fall is the steep cut in imports which the foreign exchange shortfall has imposed. There may be a necessary and healthy return to natural fertilisers — both biotec and animal. The heavy reliance of the VIII plan on public sector enterprises savings to the tune of one third of what is needed justifies the government's setting up a monitoring mechanism starting with coal and power—where there is the large leakage which needs to plugging. The question is whether this machinery would be a paper triger : it may become that, but the situation is so desparate that this monitoring of the public sector projects should be tried out. A disturbing industrial development is the sharp 6 million tonnes (4 per cent) fall in railways revenue earning traffic. This should be investigated and not passed off as normal for this stock season, or ascribing it to the loss of 8 million tonnes of coal by ECL and WCL to road traffic. Why is there this more costly alternative resorted to, when railways are both cheaper and have adequate capacity. It is to be hoped that the project reports required from growth centres as the basis of the project outline and description, industrial and social infrastructures, financial plan and possibilities of private participation will see growth centres losing their closed nature and benefitting the hinterland where they are located. This has to be ensured in order to make the growth centres sponsored by the industry ministry an essential part of industry producing development and employment.

Public Sector Enterprises

Earlier reference was made to the very large contribution to Plan resources that public sector enterprises are expected to make and to some means being taken by the government to ensure this. There are two other actions needed now. One is to help them cut their production costs to the extent of 5 per cent or Rs. 5000 crores per annum. Can this become a clause in every MOU. Further are there possibilities of MOU or sub MOUs concentrating on large — mega projects because that is where the leakage is. There are other areas of savings indicated such as conserving foreign exchange for which a premium may be given as an incentive a sharp reduction in the gestation and of projects and conservation and efficient use of energy. The most important development that the resource crisis has given rise to is that at long last 5 public sector units which are perenially sick (Cycle Corp, National Bicycles Corps, Bharath Opthalmic, Richardson & Cruddas and Cement Corporation) are being put up for sale to the private sector which two (Fames and Foot wear and Bharat Leather) also sick units are being merged BBIL. This when acted up on will a good and sound state which should be followed by similar action on all sick public units.

National Production Front

Steel

Why are SAIL's steel plants suffering net losses ? Even the profit of Rs. 225 crores reported for 1989-90 is for the major part eaten by the loss of Rs. 100 crores during the first 6 months in 1990-91. Or again the Visvesraya Iron and Steel (VISL) taken over by SAIL recently is recording in 1990-91 a loss instead of the budgeted profit of Rs. 2.2 crores. This needs looking into in order to isolate the extent to which the technology in use is obsolete, the power intensity is on the increase, and not simply the effect of higher power tariff rates, where VISL has to explain its current high losses, the decline in sales because its product does not meet the demand specifications, and the precise role of rising input prices, to which alone SAIL attributes its losses. Will there be some improvement in its profit / loss balance resulting from its switch to high value items such as the increased production ratio of standard tested steel, high strength rails, electrode quality wire rods ? What would be the effect on steel supply and prices and on SAIL plants of the delicensing of steel which will encourage new entry and expansion of Indian steel products ? Exports are planned to double in 1990-91 from Rs. 115 crores in 1989-90. How far is the use of export subsidies covering the high unit cost of domestically produced steel ? What will be the effect on exports and imports of steel of the recognition of SAIL as a trading house How is the actual financing of SAIL from own resources, deposits, drawals from Steel Development Fund other borrowings compared to the financing plan for the year. There is need for this kind of continuous monitaring in order to help the industry to turn around and pay for the heavy investment in it.

Crude

The effect of the gulf crisis on the economy has been earlier examined from the point of increase in cost of crude imports and its effects on industry, agriculture, inflation and balance of payments. There are other aspects which need attention. One is the question whether enough is being done to increase the domestic supply of crude. There seems to be some slowing in the exploring activities, for in October towards the end of the month only one oil producing well is reported from the Krishna Godavari basin. There is the ambitious but urgently needed programme to stop the flaring of natural gas in the Bombay High fields, starting with reducing the flaring by 11 million cubic metres per day by the end of the VIII Plan. Simultaneously there is a sound plan to raise the output of two of the major carbonate reservoirs. Where are the funds for these two imported production increases computed at Rs. 3500 crores to come from? The major part will have to be from World Bank but for that ONGC should also build the matching domestic resources. There is also the parallel ONGC scheme to implement the resulting gas surplus and increase of associated gas production in the first underground gas gauge in the eastern region. Another supply source is the expansion of the capacities of refineries underway and here the question is whether they are to use increased domestic production or imports. On the demand side, the government's decision to import a 15 per cent cut in petrol consumption should not be ad hoc and arbitrary. It has to be accompanied by a form

of rationing which is what is being contemplated in POL quota to each industrial unit based on the past 3 years comsumption. This has resulted in a cut of 10 percent of POL supply to the private and of 20 per cent to the public sector units including government enterprises. Here it is important to plug loopholes and reduce the possibility of black marketing. The exemption from the cut of the actual POL users engaged in the manufacture of certain automobile parts and plastic production should not become the thin end of the wedge for evasion. In any case why is the automobile industry chosen for such special treatment? What is its priority for the country?

Coal

On the coal scene, the very serious short fall in coal supply faced by the power plants in the south has been referred to earlier in this and previous issues. To solve this problem from the point of distance involved in transplanting coal from West Bengal and Bihar to the South, Coal India is proposing to bring together the southern part of the south eastern coal fields, Talcher and some mines in Orissa and MP in a new company which by its proximity will meet the coal needs of the power plants in the south, particularly those in the pipe line like Mangalore in Karnataka and Kayamkulam in Kerala and remove the bottlenecks in the existing linkages. But distance is not the only problem. An equally serious one is industrial relations in the coal and transport sectors which have caused much of the short supply problems for the south. There is an official proposal to create a 1 million tonne crude oil buffer to guard against the oil scene fluctuations in the gulf crisis. This may not be feasible because there is no foreign exchange for it and even more the buffer is too small in relation to the volatability of the international market and India's annual need of 40 million tonnes.

Agricultural Production

As pointed out in the last issue for the third year running there has been a very good south west monsoon. It is 106 per cent of normal, with good distribution of precipitation over time and space the areas usually prone to floods were spared during serious devastation. Under these conditions, it is understandable to see a certain optimism in the foodgrain output forecast as being likely to cross the 175 million tonnes target. It is too early to make estimation of food grain production, but the forecast is for 100 million tonnes for kharif and 78-80 million tonnes for rabi. These plentiful food supplies should keep inflation and the effects of the Gulf crisis in check. If the actuals are anywhere near these figures, the government must ready itself to procure the foodgrains so that there will be no dificulty to the farmers marketing the surplus and the case for restricting the public distribution system which makes available subsidised foodgrains to the poor which will both reduce the strain on public resources and release a sizable quantity to the open market which will keep prices down. Out of the current year's plentiful production a record 3.67 million tonnes of paddy have been procured. Another non food crop production area which is likely to have bumper yield is cotton and if the somewhat optimistic forecast of 125-130 lakh bales is anywhere near realised, there should be both easing

of cotton supply to textile mills and increased supply of yarn to the decentralised sector and increased export of cotton upto 35 — 40 lakh bales which will replinish somewhat the near empty foreign exchange reserve of the country. The two areas which raise some anxious questions are — pulses and oil seeds. Why has the production of pulses not increased to the target level of 13-14 million tonnes but looks like stagnating at 11 million tonnes. Now there has been adequate water and improved varieties with no serious pest. This performance needs close scrutiny. The other poor performer is oil seeds which faces a double problem. On the one hand the trend in production of oil seeds is irregular, leading to sharp fluctuation in the price of edible oils and is inadequate in relation to the demand for oil. And that is the other problem which needs attention. The country cannot afford to import oil or oil seeds to meet the constantly increasing demand. As in the case of petro products, there is need for some restraint in edible oil consumption by the well to do. Should there be some system of quotas to operate here. In view of the abundant supplies of food-grains and the unfortunately limited purchasing power of the mass of the people, should there be a programme for its export of rice and wheat both to earn some foreign exchange and purchase the protein giving pulses ? All agricultural exports should earn around Rs 3000 crores and this is not pea nuts.

Foreign Trade and BOP

Will the export target for the year, whose increase to Rs. 37,000 crores was reported in the last issue likely to be attained ? At this mid year point, the answer is no and one result will be not only an increase in the trade deficit which the Gulf crisis and its resultant hike in petro products prices has involved but also the worsening of the balance of payments situation. Exports which were targeted to increase 37 per cent have, because of the slow down in exports to the gulf and the industrial countries the lagging exports of textiles and engineering goods and a rather sharp decline in handicraft export (because of raw materials shortage), at this mid year point registered only a 22 per cent increase. The trade deficit as of April—August was Rs. 3141 crores compared to Rs. 2691.15 crores in April—August 1989. This decline is despite the good performance by garment exports (+40 per cent), textile exports (expected to treble by 1994-95), leather goods (+35 per cent), marine products (+22 per cent) and cashew kernnels (+13 per cent) in the first 6 months. The effort to increase exports and particularly the export of farm products earlier referred to now becomes obligatory. But one further painful imperative emphasised in the first issue, what was described as national belt tightening is inescapable. There has to be massive effect to reduce imports and review every month its progress and make the necessary changes. One important and correct decision is that of the Reserve Bank to reduce and in some cases cut off credit for capital goods. There will have to be other painful such decisions to cut back on imports but this necessitates the well to do section of the community accept a measure of austerity in its style of living.

Aid and Loans

In October, the report on foreign concessional resources flowing into

India seem to conform to their reduced role set forth in the Approach Paper. There was only one multilateral loan of $210 *million* which was partly IDA and therefore concessional and even that for cyclone relief in AP. Another relief aid is $250 million from disaster relief organisation for the gulf and other refugees. There was one loan of $158 million from IFC to the private sector firms, Tata Electric Companies and another small one for $25 million for developing small and medium industries. Japan is making a loan of Rs. 8 crores for developing food production. India is negotiating with the World Bank for a loan of $600 million for railway expansion. This record means that the Plan must increasingly generate its own resource including foreign exchange in order to meet its development needs. The large IMF loan in the offing referred to earlier will fall in the category of own resources, given the hard conditions for its repayment.

International

IMF

Is not the IMF plan to set up a subsidy account made up of contributions from countries benefiting from the sharp rise in oil prices — the oil producing countries and from other countries on a voluntary basis completely inadequate in relation to the problems created by the rise in oil prices, the fall in exports, the cost of evacuations which a number of countries have faced? For IMF to state that this account will help a limited number of countries is to ignore the fact that our country is equal to all the African countries. As the Fund is being created on a voluntary basis would it not be another case of its being too little and too late in relation to the problems facing India, Africa and middle east and latin America? IMF is now faced with a new problem of indebted third world countries stopping interest payments and in some cases also repayment of the principal due for the year. In the last 18 months this level of world debt has sharply increased because of the non payment of interest (and principal). The world debt has reached $1300 billion and $90-95 billion as interest on that debt. On the ground that some developing countries are following a policy of wilfully not paying their interest and debt, IMF is being asked to pressure these countries by refusing to lend them its money. This approach is typical of the well to do countries bankers (it is a proposal from the Institute of International Finance) and does not take account of the development problem of the developing countries. Brazil for instance, which was $3.43 billion indebt in 1987 which was brought upto date by IMF and the banks but in 1989 had to stop paying interest of $ 10 billion and is now indebted by $ 117 billion. Is there any alternative to this indebtedness problem leading to cancelling the principal and getting the countries to honour their commitment to pay back the interest to the banks. In this context, IMF in the World Economy review proposes a sharp reduction in fiscal deficits of member countries which are facing lower levels of economic activity and higher interest rates as a result of the higher oil prices on the base of which it forecasts 92 per cent fall in world economic growth rate. On top of this, there is the military expenditure under in the gulf region. How are the countries to reduce their fiscal deficits except by squeezing out their development expenditure. There is a case for

cutting back on military expenditure for the US, which is a major cause for its large and increasing fiscal deficit.

World Trade

The Uruguay round of GATT on trade negotiations faces a number of issues. First the principle of trade liberalisation and its pros and cons. The World Bank in its 7 volume study titled liberalising Foreign Trade, is expectedly advocating foreign trade liberalisation through rapid dismantling of quantitative targets on imports as the way forward for developing countries. Analysing the 36 trade reform programmes of 19 countries between 1946 and 1984 it draws the conclusion that the cost of liberalisation is small in terms of higher unemployment, while economic growth has not suffered. This is bitter medicine for developing countries who face large scale problems of unemployment and underemployment. The only plus point in this remedy is that, as it lays more emphasis on reducing quantitative restriction than reducing tariff, this is a way forward that is more applicable to industrial economies. The October meeting on the Uruguay round of US, Canada, Japan and EEC in Canada, broke up without agreement on the more contentious issues, which is not surprising, with regard to cutting farm subsidies, and liberalising World Trade in textiles by scrapping MFA. So all issues have pushed on to the final ministerial meeting in Brussels in the first week of December when there will be desparate attempts at last minute comprises. Are the industrial countries willing to make some sacrifices to promote trade and development by agreeing to some solutions to their contentious issues. There is little hope from this final meeting from December for the developing countries. On textile issue (MFA), the US & EEC have now closed ranks and so the accord on phasing out of this agreement is not going to be easy. Will there not be an attempt to lengthen the transition demand to 10 years and not to demanded by the producing countries. There are other complexities in the way such as the principles to be followed in reintegration of textiles trade into GATT truncating the multilaterally agreed criteria into bilateral agreements for its implementation. In other words there are many obstacles and mine fields in the way of the successful outcome of the Uruguay round for the developing countries.

UN recommendations to close North South Gap

Initiated by Prof. Yashpal and supported by M. S. Swaminathan and Abus Salam, a group of experts called by UN have proposed a 5 point action plan to : a) include the right of access to technology in the universal declaration of Human Rights (the university here will refer to countries and not to individuals), b) promote high quality low cost technology sharing (this is a long standing unmet demand), c) develop on international coalition of governments, foundations and industries to build the needed infrastructure for science and technology, (this will be the more difficult as far as governments are concerned), d) establish a UN Commission on Etiological Diversity to safeguard global genetic estate for food and ecological security (this will call for strong national commission and commitment) and e) initiate case studies to high economic and social opportunities through diverting military budgets to

a war on hunger and poverty (the new element in this long standing demand is its phased appeal). This "Planet Assurance Programme" is urgent and needed and calls from Commitment cooperation of all scientists, scholars, and intellectuals. Will this be forthcoming ?

World Population

The World Bank's World population projection 1989-90 edition estimates world population in 1990 at a huge 5.3 billion, increasing by 90 million this year. By 2010 the world population will be 7 billion and by the end of the 21st century pass 11 billion. India has the highest to world population growth in contradiction to its low per capita a GDP or industrial production contribution. One question about these projections is that they take no account of both the levelling off process, the attaining of NRI = 0 as a long term trend and of the natural and man made disasters which will limit these exterpollations. Is it possible to revise these projection taking account of this factors, as otherwise planet earth centre will not be able to support the numbers projected?

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II. Agricultural Development in Tamil Nadu

Paddy and Other Crops

Farmers in the state have responded well to the very good start of the North East monsoon but the monsoon which events in early December by itself does not meet their anxieties — seen in their limited paddy coverage which ought to be 24 lakh hectares, but seem more likely to be 20 lakh hectares. The short fall in cultivation by the farmers is in every district. The most glaring is in Thanjavur, where they normally bring 4.1 lakh hectares under rice but have limited this year to a little over 2.5 lakh hectares-1/3 by their direct saving and 2/3 by transplanting. They are ready with seedlings for an additional 1.5 lakh hectares but what is holding them back is the water they need after the monsoon, particularly in the first fortnight of January when the paddy plants germinate. This farmers reluctance to commit themselves to the full paddy area is traced to their worry over the low Mettur reservoir storage, which has led the government to start the annual plea for 20 tmcft of water from Karnataka and which Karnataka has as of now refused. Whatever may be the award of the tribunal (See Vol. XX p. 31), there is need for Thanjavur farmers to be weaned from their heavy and almost sole reliance on the paddy crops. While the Thanjavur farmers reluctance can then be explained, why is there in other districts the same shortage in paddy coverage. For instance farmers in Kanyakumari who have had this year 2 good monsoons — both south west and north east — have not covered their normal hectarage. Similarly the farmer in Coimbatore, Madurai, Tirunelveli, Tiruchi and North Arcot have recorded a short fall in their Kar, Kuruvai,

Sornavari and Samba hectarage. This reaction of the farmers should be carefully and fully examined, as it is not possible to go on pushing them to makeup for the shortfall by increasing productivity and in light of the rise in ground water levels brought about by the monsoon. There is not much more that they can do. The one positive element is that of the farmers growing a bumper coarse cereals crop. On the other hand, unlike the rest of the country, the cotton growing farmers have cut their production because of the fall in cotton prices during the last season (on which CCI should act this year) and the pest in Madras district).

Research Results

Of the 37 research reports recorded in October fiver have an immediates in terms of the land lab relation. The successful experiment of AP Agricultural University on water harvesting technology can be transferred immediately to Tamil Nadu in coastal areas can be transferred immediately to Tamil Nadu Coastal area farmers. The technology will enable farmers to tap potable sub soil water and use it for raising crops on sandy soils, using the drip dry or sprinkler system. It involves only a one time investment by the farmer with very low maintenance cost. A second useful demonstration which can be transferred to farmers facing alkali or sodic soils is the successful demonstration by TNAU that by ploughing the field while it is moist, building 40 cm field bunds the boundary, constructing a drainage channel which well receive water from the gentle slope and remove the excess, using canal water build a collectordam and a main channel and mixing gypsum, and zinc sulphate and a salt tolerant variety like CO-43 or IR-20, the soil productivity —— normal and improved. Third a series of successful trials to improve sugarcane production and productivity, which is needed the cost of the end product — sugar and khandasari is continuously rising - in Cuddalore. Indian Institute of Sugarcane Research, Lucknow and TNAU — can be used by sugar cane farmers by using the demonstrated improved rising system of planting, through foliar spraying of urea Nitrogen doses and applying available bio fertilisers at stated level and doses. Fourth the successful research at AP Agricultural University at Anantapur can be adopted by orchard farmers grafting softwood on custard apple seedling during the month of February when they are a year old which increases yield and improves the quality of the fruit. Similarly the methods used by the Irrigation Management of Training Institute, Tiruchi for adapting TNAU's CO2 cowpea variety as both vegetable and grain can be used by pulses growing farmers. Finally the land farm of the Aurobindo Ashram, Pondicherry has demonstrated a model farm for cattle care involving use of Indian breeds of cows and the means of providing them with good nutrition and health care. what these are, have been established in very simple and not costly terms, and the resulting doubling of milk yield is what all milch animals owning farmers who have supplementary income from milk can immediately use.

Soil erosion

Does the Geddai, Udagamandalam October end disaster in which 35 persons died raise the question of soil erosion? The Nilgiris hills are highly eroded and what is needed is the pointers provided by the central soil and water conservation research and

training institute, Dehra Dhun, in using "friendly technologies", vegetative structure and gabion structure to save similar happenings in the sub Himalayan belt. Should not the Institute be invited to look at the erosion technologies which the villages and hamlets there can adopt as the hamlets of the Shivlik range, in Haryana, Punjab and HP have done for their environmental safety and agricultural well being.

Plantation Crops

The Plantation industry—tea, coffee, cardamom, cashew, rubber—raises several problems in its October review. First should the demand for expansion of area under plantations be promoted and the ban on such expansion in regard to forest and farm areas be lifted? The value of expanding the area may be straight away conceded as it will result in increased production, increased domestic consumption particularly of tea and rubber and increased exports of tea, coffee, cashew and cardamom. But such expansion will reduce the already low forest cover of the region and the states and give rise to the problem of erosion referred to above. Here would the new UPASI scheme for increased tea production and diversification without disturbing the ecology be the answer. Under this scheme cultivated areas with a 10 to 30 per cent slope are selected for tea plantation, leaving the gentle slope as well as the flat land for vegetable cultivation. UPASI estimates 4000 hectares of such cultivable land could be brought under tea plantation and by the end of the decade a further 10,000 hectares — which will increase per hectare productivity by over 50 per cent and add another 12 million kg of high quality tea. A second issue is the amount of land tied up in litigation. In one taluk alone — Gudulur — 4000 hectares are under litigation for over 2 decades. Should there be legislation to untangle this waste of good plantation land? A third area raised relates to exempting plantations from the recent amendment to the Land Reform Act which sets limits of personal ownership and identifies all benami deals. This demand should be turned down flat, as it not only prevents inequality in land holdings but also works against the long term interests of the plantation industry. A fourth issue is leaving the planter free to convert his land production from one plantation crops to another. For instance in view of the declining profitability of coffee cultivation and the increased prospects for tea, some planters want to convert from coffee to tea. This could be selectively encouraged, if the needed investments are from the tea industry itself. A final demand is for the state government to match the union government's tax reliefs and concessions. A start here can be for the state government not add to the tax burden of the industry and ensure that its sales tax concessions are implemented. A related issue raised in a review of the tea industry is the minuscule R & D expenditres. Against the industry's turnover of Rs. 3000 crores and export earnings of over Rs. 1000 crores, R & D is of the order of Rs. 5-6 crores. The need and urgency for R & D in tea is the growing gap between the rate of growth of tea production which is 2.76 per cent during the last 2 decades while during that period consumption increased at 4 per cent. R & D has to address itself to improving the yield as the extending the area is not moving fast enough to meet the demand growth. What are the factors holding back R & D in the tea industry? Is it its remote location, ? is it the lack of a breakthrough

in biotechnology application, is it the discontinuous tea processing sector? These need careful investigation so that R & D can be equal to the domestic and national demand for tea, where India's share in world exports has declined from 50 per cent in 1956 to 20 per cent today. At this time, when there is likely to be a pause in tea exports expansion because of the gulf crisis, the R & D thrust areas may be launched. One plantation industry is in trouble — cardamom prices have fallen by 50 per cent from Rs. 400 a kg. to Rs. 200 and the planters report that they are forced by the trading middlemen to make distress sales. Can the Spices Board undertake some immediate relief action by recommending to government support / procurement prices for it to be operated by it?

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III. Industrial Development in Tamil Nadu

Industrialisation in the State

In October the industrialisation trend in the state had both positive and negative months, with some tilt towards the latter. The governments decision to encourage industries to come into the state is a clear and firm one, how it is being translated into actual action can be seen in this brief balance sheet for the month. In this connection too much attention need not be wasted on what the Tamil Nadu's Industrial development place, whether it was in the third place state wise in the fifties from which it slipped to the 13th place in the eighties, and whether now it is moving up—some official claims are that it now occupies the third place. This discussion is a waste of time because different figures can be arrived at by using different methods of calculation.

On the positive side, the state which has been pioneered in the *industrial states,* is pushing ahead with the two SIPCOT estates at Manamadurai and Gummidipoondi referred to in earlier issues. (See vol XIX pp 245 & 247, Vol XX pp 170 & 171). The aim is to bring these two estates to the level of the older one at Ranipet and Hosur and in this direction industries are coming up. These industries are the new ones on the industrial horizon, called sunrise industries. The Electronics Corporation of Tamil Nadu (ELCOT) has set up a *software centre* which will need and use the common facilities for computers, testing etc. provided by ELNET. This is an industry which is outward oriented as its product to the extent of 60-70 per cent is exported. This is similar to the area where the state industry maintains its leading position in regard to *garment exports,* which together with other southern states has recorded an impressive increase of 39 per cent in the first seven months of 1990. The new quota policy for garment exports will ensure a 10-15 per cent increase this year in the state's garments production and exports. The producers in the state wish in particular to explore exports to non quota countries. The plea is for a well equipped technology institutes which SIPCOT should help set up. The state is also catching up in the

electronics field, to make up for the time lost in having missed the first electronic revolution in the seventies. Now it remains to be seen how industries — small and medium respond to the two important incentives offered by government to them. One is the capital subsidy of upto Rs. 35 lakhs and the other is the drastic reduction in the sales tax on electronic items. At Hosur an exclusive electronic estate has been set up. Other positive facets include the debut of *the JK group* in conjunction with TIDCO, setting up a pencillin — Gplant at a cost of Rs. 91 crores in Cuddalore. The same area is being developed also *by SPIC* with a Portugese tie up. Another encouraging trend is the decision of the sick *Kothari General Foods* (KGF) see vol. XX p. 370 which had been referred to BIFR for its rehabiliation, is being amalgamated with Brooke Bond. With this, KGF's sick days are over, it is hoped. Finally an indirect plus point for the state's industrialisation is the Rs. 4 crore modernisation of the *Integral Coach Factory* whose modernised manufactures of electric multiple units and coaches are also expanding employment in the factory. There is also a nagative element in this indirect positive fall out. Despite this expansion in the state, the rival Rail Coach Factories the Bangalore BEML production and Calcutta's Jessops are overtaking ICF, mainly because it delayed its modernisation and expansion project.

On the negative side, two serious factors are at work hindering the industrial progress of the state and these are more powerful in their impact than the many October positive factors listed above. The first is the 30 per cent power cut on HT units referred to earlier, which adds to industries other burdens making the cumulative impact very difficult. For one thing, the 30 per cent cut will in practice become 40 and 70 per cent because of the manner of computing the maximum KVA demand during the last 3 years. These 3 years were not good years for the power flow to industries and this will increase the impact. Since a majority of power intensive units are in the medium and large sector, they have expanded their capacity under the liberal policy since the mid eighties and so will feel the power cut all the more severely. And with the gulf crisis and scarcity of diesel, their captive generation sets also cannot come to this rescue. They are under instruction to cut their diesel consumption by 15 per cent. The second major negative element is the very serious impact of the cut in alcohol supply to the alcohol based chemical industry — mainly in the small and medium sector. The alcohol supply to these units has dwindled to 30 per cent this year vis-a-vis last year's supply. This is the effect of the cheap liquor scheme on which only 2 of the proposed 14 blending units are at work. As more blending units come into operation, the chemical industry feels its position will become more tenous. Of the 50 alcohal based units only two—Chemplast and Tiruchi Distilleries—are captive units and the others have to depend on the suppliers. These 50 units and the 40 units in the unorganised sector need 500 lakh litres of alcohol a year and 750 lakh litres are estimated as the potable usa demand. If the state is serious about the industrialisation, demand of around 1300 lakh litres must be met by production within the state or by imports from other states. That is the only way in which this crucial chemical industry can be saved.

IV. Education, Science and Health

Education Reform

The main education event in October was the country wide discussion of the synthesis report of the Acharya Ramamurthi Committee giving in capsule from the thinking of the committee on the reform of the education system summarised in the last issue of the Bulletin. There were university seminars on it, workshop by educationists and a meeting of the state ministers of education with the union minister. The overall reaction was similar to the comments set forth in the last issue of the bulletin—involving a general welcome to the outline proposals to decentralise primary education to the panchayat level, making school timings reflect the needs of the school children and their parents, relaxing the entrv points of the system, making these multiple and the learning svstem both to conform local realities and its updating. The vocationalisation from class IX of the secondary school, the examination reform needed and the training of teachers were all agreed to. Where there was rather sharp disagreement was with the down playing of adult literacy and non formal education as it was not realised adult literacy is the key to adult education which is basic to improved skills, earning and living, while non formal education is the major instrumentality to ensure universal primary education in this country of mass poverty. In the education field at all levels there is a new interest in computers—computer education, the use of computers in education and training etc, which is leading new diplomas and degrees in computer science and which is being offered on the semester system for other programmes. Why is this? Another issue which keeps coming up in the old universities like Madras is the need for the faculty of the university to be represented on the syndicate or executive council of the university which is responsible for the day to day administration of the university as well as for formulation of policy. This is somewhat of a scandal that the faculty should be excluded from the administration of their institutions—which traces back to 40 years ago when this exclusion was included in the university charter. Technical education in the state has received a shot in the arm with the setting up of the advance training centre for standardisation, testing and quality control catering to the educational and training needs of environmental, engineering and medical electronics. Why this should not be set up in the Anna University which has all the infrastructure needed should be examined as now the Institute will have to develop at great cost and probably not at the level of excellence of Anna University its own infrastructure.

Science

In October on 18 member National Council of Science & Technology was constituted composed of 8 ex officio members and 9 scientists, with the Secretary of the Department of Science & Technology as Secretary. Is this implementing the 1988 recommendation of then — Science Advisory Council to its prime minister? It is doubtful if it does, because I) The Council is once more an advisory body, like all previous such groups, and not one which has the power and authority to enforce its advise, II) the ex officio members are

ministers who are not the persons who can ensure interface between the ministries, III) the main use ministers of S & T and the importers of know how — energy, textiles, coal, steel mines, chemicals and petro chemicals are not in the Council. In other words this is not the apex S & T body which could provide inputs for the planning process and ensure that available S & T is used før industrial production which had been recommended. This means that once more with all the science infrastructure and mass of scientists in the country, there will be no self reliance in any of the technology intensive sectors. The fragmented achievements in S & T did not add up to the goal of developing indigenous technology — such as BARC's report that it has successfully developed induction techniques which could boost our exports of sea food, spices and fruits, or the monsoon's behaviour validating the forecast model developed by Indian scientists, or the country having reached the take off stage in advanced computer informatics, or the acceptance of the need for developing suitable technologies for storing bio gas, or the inauguration of the Middle Atmosphere radar to study continously the middle atmosphere between 5 and 100 km above the earth. All this is needed and should blossom and continue, but there is need for an infra-structure for our S & T infrastructure to move towards an Indian technology.

Health

A national review of the universal Immunisation Programme states that it has failed "abysmally" in several states and has "fatal flows" in the policy implemented. Not only has it failed in UP, Bihar and Rajasthan where the 6 diseases it was to guard against is most rampant, worse is the finding of "extensive cooking up of the data rising up to more than 100 per cent in many states". This state of the UTP reflects a total lack of concern to improve the health of the poor who are the worst affected by these diseases. A similar survey in the Madurai area shows that the criminal and half rearted efforts by government and non governmental agencies have not helped eliminate the obnoxious traditions of female infanticide. In one village with a population of 5026 persons, infant mortality is 431 for 1000 children born. For other villages, the range is from 330 to 355 against the poor national average of 116. Villagers were laying pre-conditions for undertaking not to kill the girl child, such as the provision of a good road or a bus service. A related issue is the need to improve the technique of recanalisation procedure as a means of avoiding infan-ticide. For this, it is recommended that there is need for a Centre of excellence to monitor the performance of field workers under the family planning programmes, particularly as there is a 3 to 4 fold increase in sterilisations in the state and some parts of the country, which calls for follow up programmes to assess the success of the steriisation and recanalisation procedures. This would also help to check our statistics which show that 25 to 30 per cent of young people are going in for sterilisation.

V. Employment and Conditions of Labour

The employment perspectives in the country are somewhat confused. There are many schemes which seem to be hanging in the air. The Right to Work has a committee to work on it. Headed by the Finance Minister, it includes the union minister of Law and Justice, the chief ministers of Assam, Bihar, Gujarat, Maharashtra, Orissa, Rajasthan, Tamil Nadu and West Bengal. Dr. A. Vaidyanathan of the Planning Commission and Mr. L C Jain of the Commission as member secretary. The Right to Work was reviewed by the National Development Council meeting on October 11 heard the Prime Minister summarise the issue involved in the Right to Work and the various proposals in this regard including the launching of a) employment generation scheme for these ready for manual ladour, b) employment of the educated unemployed outside the government sector, using the Rs. 120 crores earmarked for loans to programmes c) give willing young man with limited means the right to distribute cooking gas, man petrol pumps. fertilisers depots etc. d) the encouragement of labour intensive technologies in agro industrial and rural sectors along with decentralisation of majority so that small units could be set up in rural ones. The quantitative dimensions that employment in the VIII Plan had to face is 28 million unemployed backlog at the beginning of 1990-91 plus an additional 78 million persons who will join the labour force during the plan involving the creation of 108 million jobs over the next 10 years which would mean a 3 per cent annual growth of employment, employment being the focus of all development. Now this objective has to be translated into themes which has not yet been done. e) Fourth rural areas face also massive unemployment and not only underemployment and the diversified agricultural programme is aimed at countering rural unemployment. The Right to Work which becomes justiciable will have to have what the prime minister terms "reasonable restrictions". f) And so far the employment guarantee programme is proposed a suitable law relating to the conditions stating the nature of the work location and wages to be paid for an employment guarantee scheme once the right to work becomes a statute. g) As in employment schemes the union's share is 90 per cent and state is 10 per cent and for this the existing Jawahar Rogar Yojana is to be dovetailed with employment generation schemes like road construction, irrigation, and infrastructure development, so that additional resources are not required. The government suggests on employment cess to generate resources to finance the new employment schemes. The employment proposals are many and seem unrelated and it is hoped that by next month, November,a coherent picture will emerge. On the conditions of labour the major issue is the bill on workers, participation in management now before parliament based on the recommendations of the G Ramanugam committee (see Vol. XX pp287 & 460). The committee recommends that registration of trade unions in the organised sector should be made compulsory, that the minimum strength of the trade union for recognition should be 10 per cent of the employees in the establishment or 100 which ever is less, that for the unorganised sector, 7 per cent cut of the total membership can pass

the test for registration, that there should be a mandatory on one month's notice (instead of the present 14 days) for strikes and lockouts in essential services. There are dissenting notes by Trade Union members of the comittee and employer members of the committee, relating to the right to declare lock outs, the methods of recognition of unions and on the office of the Industrial relations commission. On the bill doubts are expressed by the employers who feel that the time is not ripe for such legislation, while trade unions feel that it falls short of fulfilling the democratic aspirations of the workers.

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VI. Other Items

Adult Literacy

Several events relating to Adult literacy occurred in October.

a) The Group of the university vice chancellors and educators (see Vol. XX pp459 & 460) working on the project to close universities, colleges and higher secondary schools for a year so that all studies and staff could live in villages and urban slums and make the illiterate literates in a year met in early October under the co chairmanship of Mr. Haksar and Mr. Adiseshiah. After reviewing the results of the meeting with the political parties held in Septmeber at which there was endorsement of the idea, two decisions were made : a) to bring out a document on the project which will be authoritative statement on it, to be drafted by Mr. Yashpal, Haksar and Rajni Kothari. Second that the time had come to decentralise these consultations, the next meeting being in Madras on December 17 & 18 when there will be consultations on the project with the council of ministers, legislators, vice chancellors, teachers and students, voluntary organisation and parents.

b) There was a meeting of the standing committee on adult literacy of the University Grants Commission when the follow up of the past decisions was reviewed and decisions made about the status of the university adult education staff. The committee also had a first discussion on the project for closing universities, colleges, and higher secondary schools for a year and decided to meet again in November in light of the document being brought out by the Group.

c) There was a jatha of the Delhi Unit of BGVS organised on the inaugural day, October 2, in the old Delhi Walled city at which the work of BGVS was explained and jatha on literacy was conducted. The meeting was attended by 500 local people.

d) AIR broadcast a programme on literacy to celebrate the International Literacy Year at which several literacy workers were interviewed on the present state of the programme and its future direction.

e) There was the annual meeting of the literacy project officers from all over India of the Literacy Fund attended by 50 officers. The 5 day training and workshop programme was essentially a refresher and orientation

course for these experienced literacy leaders.

f) The SRC-TNBCE Triennial Conference was held in the Punjab Association Hall on October 25, 26 & 27. On 25th October there was a creative exchange of views among the 100 odd voluntary agencies who are members of TNBCE. The new area of discussion this year was the start of the BGVS in the state and its integration with SRC and TNBCE and the voluntary agencies. On the 26 & 27 October, the Triennial conference met on the theme Mass Programme of Functional Literacy in which BGVJ was the major component. The conference broke up into 5 commissions and examined plans for the BGVJ, the means of organising the Jatha, Training and learning materials, evaluation and monitoring and follow up. At the valedictory, the recommendation of the 5 groups were discussed and accepted with certain suggestions and the two main speakers—one vice chancellor and the other secretary to government brought out the links between government and voluntary agencies for the strengthening of the total literacy programme particularly in the five chosen districts and Madras city. The Triennial General Assembly also elected a new set of officers for TNBCE and paid a tribute to the outgoing ones.

State Planning Commission

There were 2 meetings of the Commission. The first discussed the resources for the VIII Plan arising from consultations with Delhi. It was decided to recommend to the council of ministers the state plan with outlay of Rs. 9000 crores. (The council has since approved this recommendation). The second meeting received a report about the discussions and decisions of the National Development Council and the Inter State Council to which references were made earlier and drew certain conclusions in relation to the work of the Commission.

Centre for Human Settlement

Anna University : The Centre ran a national workshop on urbanisation problem perspectives. Special attention was given to the problem of rapid and growing urbanisation, the social, economic and physical attributes of rural urban migration, and planning for urbanisation in the coming 10 years. The importance of using people, including the slum dwellers, to meet urban problems of housing were emphasised, along with means of meeting the needs of water and other urban infrastructures.

Kalyani Hospital

Kalyani organised the first convocation of its 11 nurses who graduated after 3 years of intensive training. The commitment of the programme going back to Florence Nightingale was recalled and the present graduates were congratulatad and given all good wishes for their future devoted life of service.

IIC

There were three events in October in the India International Centre. The Standing Finance Committee met and reviewed the current budget operations. It also approved the Budget for 1991-92 to be placed before the Board of Trustees. There was the monthly panel discussion, the final one, for the year on the electronics industry. There was a very good

expose of the issues, followed by a rather heated discussion on the sbsence of self sufficiency in this area and the continued dependence on imports of foreign technology and hard ware. The third event was the seminar on following day on Planning for the Central Zone comprising UP, MP, Bihar, and Rajasthan around five area — water, forest, agriculture, power and mines and minerals. It was agreed that there are many prospects of zonal planning in these areas and that the conclusion of the seminar would contribute to it. This will be of use to the zonal council as in all other zones has no work to its credit so far The problem of this zone, being the richest in resources and its people being the poorest in the country, was faced in the seminar on which certain areas of further investigation were indicated.

November Development Seminar

A paper for the November seminar, Rural Credit system for Agricultural and rural poor in Tamil Nadu, by V. Rengarajan together with a summary of the discussion of the paper that took place at the seminar appears as the first article.

Second article

A note, Some Aspects and Facets of Inflation in India appears as the second article.

Special Section

The special section in this issue comprises selected articles prepared for the summer workshop on Management of Renewable Resources held at Centre for Development Studies, Trivandrum, June 1990. The articles are :

1. Urban Land Management by G. Dattatri, Research Coordinator, MMDA—TRL' Madras 2011 Research Programme.
2. Greening to Coastal Sea Ecosystem : Collective Action and Renewable Resource Rajuvenation by John Kurien, Research Associate, Centre for Development Studies, Trivandrum.
3. Methodology for Integrated Watershed Management through operational research project by P. Samraj, Principal and Scientist, ICAR, Udagamandalam.
4. Use of Geographical Information Systems in the Management of Land Resources by S. Shivarajasingham and M. Vijayalakshmi, Madras Institute of Development Studies.
5. Syndrome of Population Growth and the Question of Common Property Land in a wet region : A case study of Kosi Embankment Area by Saroj K. Pal, Department of Physical Geography, Delhi University.

MIDS News

Dr. S. Neelakantan attended a seminar on Agricultural Policy organised by the Institute for Social and Economic Change, Bangalore during 20th to 22nd November, 1990 and submitted a paper on "Horticultural Policy — A Plea for Tie-ups"

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Dr. Pulapre Balakrishnan delivered invited on 'Open Ecodomy Macroeconomics' as part of the M.Phil. programme at Centre for Development Stndies, Trivandrum during 26th to 30th November.

He also participated in a seminar following action by Prof. Robert Stern on "Adaptation to Changing Patterns in the Global Trade System" organised by 'SICCI' and 'USIS' on 6th December.

* * * * *

Dr M.S.S. Pandian presented a paper, 'Colonialism and Legitimisation : An Essay on Vaikundaswamy Cult, Travancore' in a workshop on 'Culture and Legitimisation in Colonial India' held at the Centre for Historical Studies, Jawaharlal Nehru University, New Delhi from 26th to 28th November.

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Mr. S. Guhan addressed the Rotary Club, Madras Central on "The Case for Reservations" on 3rd December.

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Dr. Judit Kiss, Senior Research Fellow and Head of Research Centre for Development Studies, Institute for World Economics of the Hungarian Academy of Sciences gave a seminar on "Recent Political & Economic Changes in Hungary" on 4th December.

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Rural Credit System for Agriculture and Rural Poor in Tamil Nadu*

by

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1. Premise :

J.A. Schumpeter referred to credit as a phenomenon of development[1] considering the potential of Bank credit to promote economic development. In view of the high potential of bank credit, to be a catalytic agent for development, Government as a matter of deliberate policy, has been making all-out efforts to associate banks and various financial institution particularly in post- nationalisati on period (from July 1969). The recognition of potential of credit for economic growth was clearly evident when the steps were taken for socialisation of credit. Further, as a consequence of the above fact, number of anti-poverty employment programmes like IRDP, SEEUY, SEPUP, SUME are being implemented with the direct involvement of bank credit. Multi credit agencies viz. commercial bank, co-operatives and Regional Rural Bank have started functioning intensively for the development of Agriculture and Rural poor.

Hence an attempt has been made in this paper to present a bird's eye view of existing rural credit structure and its functioning for the development of Agriculture and Rural poor in Tamil Nadu in three parts as follows:

I Part - Rural Credit System in Tamil Nadu

II Part - Estimation of Credit requirements

III Part - Issues and Suggestions

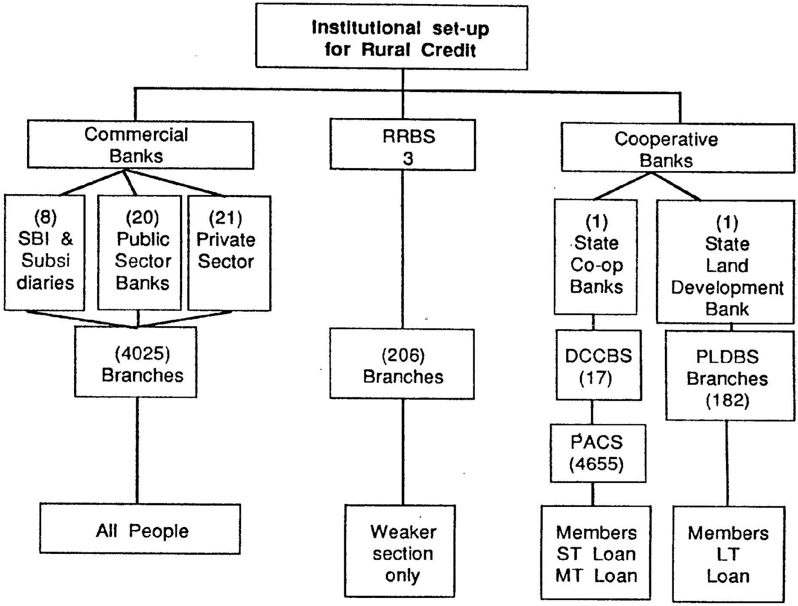
PART I

Banking System. In Tamil Nadu

Similar to all India Pattern in the Banking structure, Tamilnadu has the following set up for channelising the institutional credit to the Agriculture and Rural Development. The Structure is presented in the following diagram:-

* The views expressed in the paper are personal and do not represent the institution the author belongs

(1) - J.A. Schumpeter, "The theory of Economic Development



(Figures in parenthesis denote number of units as on 1989) (Industrial Co-operative Bank and TIIC are not included as their contribution to Agriculture is not significant. NABARD is also excluded as it is only refinancing agency.)

Progress of Commercial Banks:

Tamilnadu has always been one of the well banked states in the country and this has also contributed to the economic development of the State. Starting with 1060 branches in June 1969, on the eve of nationalisation, the commercial banks have made a rapid progress in Tamilnadu to reach a level of 4231 branches in December 1989 including 206 branches of Regional Rural Banks.

A comparative statement on the progress of commercial banks in Tamilnadu State and India under key banking parameters are furnished in Table 1.

Highlights of the progress of Scheduled Commercial Banks in Tamilnadu State:

Table No.1 reveals the following:

1. Tamilnadu stands 5th position in having maximum number of Bank offices in India, the share being 7.29% (State/UT wise position in Annexure I).

2. The population served per bank office in the State is 12000 which is better than all India coverage being 13000 (1989)

3. The per branch deposits in all population group wise centres is lower than the national averages. In regard to advances per branch advance is higher than national averages.

Progress of Scheduled Commercial Banks
(June 1969 and September 1989)

Sl. No.	Parameter	All India June'69	All India Sept '89	Tamilnadu State June'69	Tamilnadu State Sept'89
1.	Rural				
	a) No. of offices	1833	32873	113	1850
	b) Deposit (Rs. lacs)	14496	2340800	715	121631
	c) Per Branch Deposit (Rs. lacs)	7.91	71.21	6.33	65.75
	d) Advances (Rs. lacs)	54.29	1479174	488	125986
	e) Per Br.Advances (Rs. lacs)	2.96	45.00	3.96	68.07
2.	Semi-urban				
	a) No.of offices	3342	11241	496	1045
	b) Deposit (Rs. lacs)	102406	3310748	6634	228095
	c) Per Br.Deposit (Rs. lacs)	3064	294.52	13.38	218.27
	d) Advances (Rs. lacs)	40647	1655861	5089	179397
	e) Per Br. advance (Rs. lacs)	12.17	147.31	10.26	171.67
3.	Urban/Metropolitan				
	a) No. of offices	3087	13697	451	1317
	b) Deposits (Rs. lacs)	349617	10008028	22000	647318
	c) Per Br.Deposit (Rs. lacs)	113.25	730.67	48.78	491.51
	d) Advances (Rs. lacs)	314800	6803674	32526	686917
	e) Per Br.advance (Rs. lacs)	101.98	496.73	72.12	491.51
4.	Total				
	a) No.of offices	8262	57811	1060	4212
	b) Deposits (Rs. lacs)	466519	15659579	29349	997045
	c) Per Br.Deposit (Rs. lacs)	56.47	270.88	27.69	232.72
	d) Advances (Rs. lacs)	360886	9938704	38063	992300
	e) Per Br. Advances (Rs. lacs)	43.68	171.92	35.91	235.59
5.	Credit Deposit Ratio	77%	63.4%	130%	99.5%
6.	Population per bank office (in 0000s)	64	13	39	12

Source: June 1969, Banking Statistics -Basic Statistical Returns RBI Banking - Sept. 1989 - Basic Statistics, Quarterly Handout September 1989, RBI

4. One third of the total advances of the commercial banks has gone to the rural and semiurban areas.

5. Credit Deposit Ratio maintained by the scheduled commercial Banks in the State is very high being 99.5% which is higher by 36% compared to national level.

6. The average population per bank office in the State is 12000 which is better than nation being 13000.

7. Latest data on performance of commercial Banks in the State as on 31st March 1990.

a) Compared to March 1989 level, the deposits have increased by Rs.1314.29 crores (14.2%) the advances have increased by Rs. 1184.67 crores (11.9%)

b) The share of priority Sector Advances to total advances is 43.3% as against the norm of 40%.

c) The direct agricultural advances constitute 16.8% of total advances.

d) The percentage of DRT advances to total advances outstanding as at the end of previous year was 0.63% as against the norm of 1%

e) Advances to weaker sections stood at Rs.1106.34 crores covering 28.2 lakhs beneficiaries and the share of weaker sections account for 11.1% as against RBI norm of 10% to total advances.

Regional Rural Banks in Tamil Nadu:

There are three Regional Rural banks functioning in the State. The first one being Pandyan Grama Bank was established on 9.3.1977 in Sattur catering to the needs of weaker sections in five districts vis. Kamarajar, Pasumpon Thever Thirumagan, Ramanathapuram, Tirunelveli, Kattabomman and Chidambaranar. This bank has been sponsored by Indian Overseas Bank. The other two viz. Adhiyaman Grama Bank and Vellalar Grama Bank, subsequently sponsored by Indian Bank, are serving the poor in Dharmapuri and South Arcot districts respectively. The performance of three RRBs in the State is furnished in Table No.2.

TABLE No.2

Performance of RRBs in Tamilnadu as on 31.12.1988

(Rs. in crores)

Particulars	Pandyan Grama Bank	Adhiyaman Grama Bank	Vellalar Grama Bank	Total
1. No.of Districts covered	5	1	1	7
2. No.of Branches	154	21	18	193
3. Total Deposits	29.61	1.61	0.55	31.77
4. Total Advances	42.30	2.21	1.14	45.65
5. Total Priority Sector Advances of which	33.69	2.14	1.14	41.97
a. Agriculture	29.54	1.51	0.90	31.95
b. SSI	0.67	0.05	0.03	0.75
c. Others	8.48	0.58	0.21	9.27
6. Advances to SC/ST	10.12	0.14	0.06	10.32
7. Advances to IRDP	12.98	0.20	0.13	13.31
8. Total Advances to weaker section	20.90	2.14	1.14	24.18

Source: Banking Development in Tamilnadu - SLBC - IOB, Madras. (Handout)-1989

The State Government has also recommended to the Government of India for establishing another RRB in North Arcot District.

Co-operatives in Tamilnadu:

The co-operatives in Tamilnadu play a crucial role in supporting the economic needs of the agriculturists, rural artisans and other weaker sections.

There are 4655 Primary Agricultural Co-operative Societies constituting the nucleus of co-operative movement in the State, and they provide short term credit for agricultural operations and medium term credit for subsidiary occupations besides providing loan under government sponsored programmes viz. IRDP and MAPP Scheme. There are 182 Primary Land Development Banks with one State Land Development Bank at Apex level, provide long term for land development and other diversified purposes.

TABLE No.3

Performance of cooperatives in Tamilnadu
(Rs. in crores)

Year	Short Term Coop Loan		Medium Term Agl. & Subsidiary		Long Term Agl.	
	Target	Achievement	Target	Achievement	Target	Achievement
1980-81	60.00	21.52	5.00	4.25	16.00	4.76
1981-82	120.00	77.20	10.00	9.79	10.00	5.52
1982-83	70.00	67.18	10.00	15.97	10.00	14.35
1983-84	80.00	75.34	12.00	13.22	15.00	15.42
1984-85	100.00	110.80	17.00	17.35	17.00	20.37
1985-86	135.00	130.88	20.00	20.14	20.00	24.19

Source: Institutional Finance Plan, Institutional Finance Dept., Govt. of Tamilnadu - 1985-86

It is significant to note in Table No.3 that the agricultural loan provided during 1985-86 are the highest ever recorded. Now let us see how rural credit delivery system (CB, RRB and Cooperatives) is performing n Tamilnadu system for the development of the State.

Tamilnadu State's Performance in Southern Region:

Table No.4 gives the State wise - institution wise credit assistance:

Five State in India viz. Andhra Pradesh, Maharashtra, Uttar Pradesh, Tamilnadu and Karnataka together accounted for 50% of the credit provided by all credit agencies.

TABLE No.4

Southern State wise Distribution of outstanding Institutional credit as on June 1986 (Agriculture)

(Rs. in crores)

	States	Commercial Banks	RRBs	PACs	PLDBs	Total
1.	Tamilnadu	664	26	382	173	1245
		(9.6)	(2.0)	(8.8)	(6.5)	(8.2)
2.	Andhra Pradesh	800	158	277	366	1601
		(11.6)	(12.0)	(6.4)	(13.7)	(10.5)
3.	Karnataka	636	157	239	226	1258
		(9.2)	(11.9)	(15.5)	(8.5)	(8.3)
4.	Kerala	196	40	523	161	920
		(2.8)	(3.0)	(12.1)	(6.1)	(6.0)
	All India	6919	1318	4326	2665	15228
		(100)	(100)	(100)	(100)	(100)

Source: ACRC, RBI 1989
Figures in parenthesis indicate percentage to respective all India total.

Among the five States in Southern Region, Tamilnadu stands third place in this regard. Among the institutions in Tamilnadu, commercial banks performance was higher than the other financial institutions.

The divergence in the credit supply could be ascribed to large variations in the gross cropped areas in the various regions/states. Hence credit supply per hectare of the gross cropped area, would also reveal the extent of variation. The agency wise loan outstanding per hectare of Gross Cropped Area is furnished in table No.5.

TABLE 5

Institution wise State wise Loan Outstanding per Hectare of Gross Cropped Area on 30.6.88

(Rs.)

	State	Commercial Banks	RRBs	Cooperatives PACs & PLDBs
1.	Tamilnadu	1273	19	799.4
2.	Andhra Pradesh	785.1	113.7	480.5
3.	Karnataka	638.2	118.1	404.9
4.	Kerala	1290.3	182.1	2939.5

Source: ACRC - RBI 1989

At all India level, a few states like Kerala, Tamilnadu, Punjab, Haryana, Andhra Pradesh, Karnataka and Gujarat, in terms of per hectare loan advanced, have a higher level of outstanding advances. Both at the national and Southern Regional level, Tamilnadu stands second place in regard to per hectare advances by commercial banks. Under this category of finance, co-operatives in the State also occupies second place both at national level (Rs. 799.4) and Regional level (Rs. 799.4)

For effecting the co-ordination among the above rural credit institutions and other activities, the Lead Banks, are doing yesmen services.

Lead Bank Scheme in Tamilnadu:

Under the Lead Bank Scheme, Indian Overseas Bank, Canara Bank, Indian Bank and State Bank of India, have been entrusted with the Lead Bank responsibility in Tamilnadu. Following are the lead districts allotted to each one of the above lead banks for formulation of District Credit Plan and coordination work for banking development in those districts.

For the State as a whole Indian Overseas Bank is the Convenor of Tamilnadu State Level Bankers' Committee. At the district level the above Lead Banks regularly conduct co-ordination meetings viz. District consultative Committee meeting, Standing Committee and District Level Review meetings for reviewing and monitoring the Banking Development and Credit flow to the Priority Sector (Agriculture, Small Scale Industries and Services Sector) made by the commercial banks, co-operatives and RRBs wherever they operate. One of the unique features of the Lead Bank meetings is that all the Government development agencies and banking officials (CB, RRB Co-op) functioning in the district attend the meeting under the chairmanship of District Collector, The development problems are being discussed and necessary action is being undertaken by the concerned to remove the bottlenecks.

Lead Bank	District allotted under Lead Bank Scheme	
1. Indian Overseas Bank	1. Thanjavur	5. Ramanathapuram
	2. Trichy	6. Kamarajar
	3. Pudukottai	7. Tirunalveli Kattabomman
	4. Thever Thirumagan	8. Kanyakumari
2. Indian Bank	1. Chengai Anna	3. South Arcot
	2. Sembuvarayar Tiruvannamalai	4. Dharmapuri
		5. Salem
3. Canara Bank	1. Madurai	
	2. Coimbatore	
	3. Quaid-e-Millet Dindugul	
	4. Periyar	
	5. Nilgiris	
4. State Bank of India Chidambaranar		

(Madras-metropolitan city is excluded in the scheme)

District Level Credit Planning and implementation of poverty alleviation programmes are important features of Lead Bank mechanism. The effective functioning of Lead Bank Scheme and well co-ordinated approach of the financial system in the State could be observed from the following paragraphs.

District Credit Plan (DCP)

All the four Lead Banks formulated District Credit Plans for their respective Lead Districts estimating the credit requirements for Priority Sector and credit shares under DCP were allotted to the member banks (CB, RRB and Co.op) sector wise Block wise implementation. While DCP was prepared for three years as perspective plan, Annual Action Plan (AAP) was prepared every year based on the perspective plan.

The overall performance of AAPs under Priority Sector in the State by the multi-agencies, is given in Table No.6.

TABLE No.6

Performance of the Banks under Annual Action Plan

(Rs. in crores)

Year	Credit Allocation	Achievement	Percentage of Achievement
1982	507.79	497.43	98
1983	549.50	580.84	106
1984	565.82	753.48	133
1985	749.55	1038.20	139
1986	963.51	1152.99	120
1987	1202.41	1404.09	117
1988	1404.95	1596.21	114
1989-90	1591.79	1730.90	109

Source: SLBC, IOB Madras

Participation in Govt. sponsored Poverty Alleviation Programmes

The achievement under three important programmes viz. IRDP, SEPUP and SEEUY is furnished in table No.7 to 9

Table No.7

Performance of the Banks under IRDP

Year	Target in Physical Units	Achievement	
		No.	Amount (Rs. lakhs)
1986-87	221030	236357	8105.65
1987-88	269380	278127	8374.05
1988-89	224928	257203	8487.48

Source: Banking Development in Tamilnadu, Handout by SLBC, IOB, Madras 1989.

TABLE No.8

Performance of the Banks under Self-Employment Scheme for Educated Unemployed Youth (SEEUY)

Year	Target Physical	Sanctioned	
		No.	Amount (Rs. lakhs)
1983-84	17500	22162	3240
1984-85	21700	22500	4181
1985-86	18100	18722	3269
1987-88	9050	9278	1766
1988-89	18100	16814	2849

Source: Banking Development in Tamilnadu
Handout - SLBC - IOB 1989

TABLE No.9

Performance of the Banks under Self-Employment Programme for Urban Poor (SEPUP)

Year	Target Physical	Sanctioned	
		No.	Amount (Rs. lakhs)
1986-87	41970	38148	1042.63
1987-88	42972	38361	1070.23
1988-89	44670	37205	1097.07

Source: Banking Development in Tamilnadu
Handout SLBC - IOB Madras 1989

Table 6 to 9 reveal that the performance of Banking system under Annual Action Plan was very impressive and they were not lagging behind in providing financial assistance to various development programmes. This good performance shows the co-ordinated approach by the bankers for Agriculture and Rural Development under Lead Bank Scheme.

Yet another instance of good co-ordination among the commercial banks and co-operatives under Lead Bank mechanism in the State is the effective and quick implementation of Agricultural and Rural Debt Relief Scheme, 1990 with the total amount written off around Rs.500 crores. (The Hindu 6.9.90). This has enabled the state to claim as the first state to implement the ARDRS in India.

Under the Lead Bank Scheme, Service Area Approach is an important aspect in the field of credit planning of micro level.

Service Area Approach:

Under Service Area Approach, 15638 villages in Tamilnadu have been allotted to 2769 bank branches in Tamilnadu which works out to an average of 6 villages per

bank branch. That is to say about 68% of total branches of 4131 bank branches have been allotted with villages for implementation of Service Area Approach.

These branches have completed the village surveys and prepared villagewise credit plans for the years 1989-90 and 1990-91. The Village Credit Plans have been aggregated to form branch Credit Plans. The aggregation of Branch Credit Plan would become Block Credit Plan and aggregation of Block Credit Plans would form the District Credit Plan taking into consideration of Priority Sector needs in urban areas. The total outlay for Tamilnadu under Service Area Credit Plan for 1989-90 prepared for 19 districts aggregated to Rs.1591.79 crores which is 14% more than Annual Action Plan outlay of Rs.1404.95 crores for 1988. The districtwise and schemewise performance of the Banking system for the entire State of Tamilnadu is furnished in Annexure II and Annexure III respectively. Sectorwise performance of Commercial Banks, Co-operatives and RRBs under ACP 1989-90 in the State is given in Table No.10.

It could be observed from the table that the banks in the State jointly have surpassed the credit target given under Annual Credit Plan (ACP) 1989-90 by 9%. Among the banks, the commercial banks have taken a major share (63% of total outlay) and their performance was also good by achieving 105%. Among the credit institutions, the co-operative banks have performed very well with percentage of achievement being 140 although their share under ACP was comparatively lesser than the commercial banks. RRBs in the State also have not lagged behind by exceeding their target by 15%. Locking sectorwise performance, agriculture continues to receive lion's share in the allocation under ACP. Commercial Banks and RRBs, have fallen short marginally to their target in services sector and agriculture sector respectively although they have exceeded the overall targets under ACP, whereas, the co-operative banks have performed well in all the three sectors fulfilling their accepted targets. However, as it has been pointed out[2] that among the co-operatives, Land Development Banks (Long Term Finance) performance have fallen short of target by 21%.

District wise Performance of the Banks:

A glance over the districtwise performanced (Annexure Ii), 1989-90 reveals that the banks have achieved their targets in all the districts in the State except the following districts viz., South Arcot (84%), Nilgiris (79%), Dindugul Quaid-e-millet (80%) and Tiruchirapalli (93%) under Agriculture Sector, there was shortfall in 4 districts namely, Dindugul Q.M. South Arcot, Dharmapuri and Nilgiris.

In Chengai Anna, South Arcot, Dharmapuri, Salem, Nilgiris Madurai, Dindugul Quaid-e-millet, Trichy, Thanjavur and Pudukottai, target has not been reached under SSI Sector.

Under Services Sector, only in 7 districts, viz., North Arcot (composite) Dharmapuri, Salem, Periyar, Kamarajar, Tirunalveli Kattabomman and Chidambaranar, the banks have reached their targets.

District Credit Plan and State Budget:

On an average an investment of Rs.1400 crores in various key sectors viz. Agriculture, SSI and services is being envisaged under Annual Credit/District Credit Plan for deployment from commercial banks, RRBs and co-operatives and is being infected into the

2. Background materials - state Level Review Meeting - Sept. 1990, State Level Bankers Committee, SLBC - IOB, Madras.

TABLE 10

Bankwise Sectorwise performance under Annual Credit Plan - 1989-90 Tamil Nadu

(Rs. in lakhs)

Banks	Target				Achievement				% of achievement to total target
	Agriculture	S.S.I.	Services	Total	Agriculture	S.S.I.	Services	Total	
Scheduled Commercial Banks	64430.92	16998.00	19312.30	100741.22	71855.59	17799.60	15892.24	105547.43	105
RRBs	1778.91	112.66	405.92	2297.49	1566.08	168.94	901.97	2636.99	115
Co-operative	36544.73	3795.89	6581.91	46922.53	42165.44	6293.45	10715.81	59174.70	140
Others	28.65	6782.17	2407.25	9218.07	—	3625.82	2105.21	5731.03	62
Total	102783.21	27688.72	28707.38	159179.31	115587.11	27887.81	29615.23	173090.15	109

Source: Compiled from 49th State Level Review Meeting - Background papers - SLBC Indian Overseas Bank - Madras - Sept.1990.

banks. RRBs and co-operatives and is being injected into the economy of Tamil Nadu every year since 1986. It would be academically interesting to know how far the credit outlay under DCP, prepared by the Lead Banks, is supplementing the effort of State Government in realising the State plan implementation. Although it is difficult to directly link up the Annual Action Plan (AAP) (an exercise which is carried out independently by the Lead Banks mainly for the development of Priority Sector in each district taking into considerations of district potential) with the State Plan which on the other hand, is prepared for the state as a whole based on the budget allocation, an attempt has been made to present in Table II. The details of outlay under State plan and AAP, envisaged under each one of the sectors. This exercise is carried out with number of limitations in the areas like alignment of scheme/subsectors and reference period between the two viz. State Plan and AAP. However, care has been taken to select those sector/subsector which are related directly to the institutional finance. Another difficulty is that AAP does not envisage for non-priority areas like medium and large scale industries. Hence a broad indication may be possible to scan the degree of support from the financial institutions particularly from the commercial banks, RRBs and co-operatives to the State Development Plans.

Table No.11 reveals that the outlay under AAP - 1986 was higher than the State Plan allocation made in 1986-87. In this context, it is pertinent to quote the observation made by SLBC convenor[3] "the annual credit outlay planned by the banks in Tamil Nadu is almost equal to the State Government's plan outlay. Thus, the State Plan outlay for 1987-88 was Rs.1341 crores (revised budget estimate) whereas the AAP outlay of banks for 1988 was Rs.1404.95 crores".

TABLE 11

State Plan and Annual Action plan.

(Rs. in crores)

Sector	State Plan 1986-87		AAP - 1986 (Achievement)
	Allocation	Of the allocation expected assistance from Banks Institutional finance	Prepared by the Lead Banks for the developmentof priority Sector, excluding Madras
1	2	3	4
Agriculture	603.79	545.99	758.28
Industries	51.74	46.50	186.07
Services	444.29	354.86	208.63
Total	1099.82	947.35	1152.98

Source: Col.No. 2 & 3: Institutional Finance Plan - Institutional Finance Dept. - Govt. of Tamilnadu - pg.25 & 26 1985 - 86

Col. 4: Tamilnadu - An Economic Appraisal - Evaluation and applied Economic Research, Govt. of T.Nadu, 1987-88

[3] Banking development in Tamilnadu - Handout - IOB convenor SLBC, Madras-89.

From the above review, two interesting features emerge:

1. The higher outlay under AAP every year would indicate a good presence of institutional credit support extended by the banks to the Govt. Development Programmes.

2. Another one is that maintenance of very high credit deposit ratio by the banks in the State being 99.5% against 63.4% for the country. Table No.1 implies that the deposits mobilised within the state are deployed locally in greater measures for the developmental activities of the State thereby improving the economy of the State in general and alleviating the poverty in particular.

In order to measure the complete involvement of the banks is supplying finance, the investments (besides credit deployment) made by them in the loans of State Government, should also be taken into account. Thus, while CD ratio of the State was 94.2% (1988) Credit & Investment Deposit Ratio was even higher at 107.4% in the same year.

The performance of the Banking system in Tamilnadu State is commendable. However there is a need to improve their performance in a few district as referred to noted earlier. Another area which merits attention of the Bankers, is the Sector/ schemewise/villagewise achievement under the credit plan prepared under Service Area Approach.

Part II

Estimation of Credit Requirements

In view of the Government decision to accord to priority to agriculture and rural development by allocating not less than 50% of investible resources, estimation of requirements of credit for rural area assumes importance.

Some agencies/committees have already made some estimation, on credit requirements for agriculture following different methodologies and assumptions. Following three estimations are taken for discussion:

1. National Commission on Agriculture (NCA)
2. Agricultural Credit Review Committee (ACRC)
3. Lead Banks (LB)

Methodologies followed by NCA:

For working out short term credit/crop loan, it is assumed that Rs.600/- per hectare for irrigated area and Rs.450/- per hectare unirrigated area and on the basis of above, short term was estimated by NCA for the year 1985.

	(Rs. in crores)
Short Term :	7884
Medium Term & Large Term :	8665
Total for agriculture	16549

By adopting graduation method, the estimation has been brought down to Rs.9400 crores including short term credit of Rs.4000 crores by the year 1985. The actual disbursements, according to ACRC amounted to Rs.12647.7 crores far exceeding the estimate made by NCA. This is mainly due to, as observed by ACRC, the very low credit requirements for hectare, assumed by NCA in respect of the various agricultural activities, and due to impact of inflection of the cost of inputs. Further, it is pointed out that estimate was made by NCA at macro level, based on the same unit cost for a particular type of activity for the whole of

India without taking into account the Regional variation in costs. Avoiding this lacunae ACRC has scientifically attempted to estimate the credit requirement.

Estimate by Agricultural Credit Review Committee:

ACRC has estimated the financial requirements and the demand for credit upto 2000 A.D. for agriculture sector. The following are the important features in the methodology adopted by ACRC for the estimational exercise eliminating the assumptions made by the NCA.

1. Total requirements of agriculture credit is clearly distinguished from the demand for agricultural credit.

   Total requirements of Agricultural Credit (Financial Requirement) = Credit needs if all farmers obtained from the sources of credit, needed for agriculture operation.

   Credit Demand (Credit requirement) = What agriculturists may actually wish to borrow from institutional and non-institutional sources

2. It takes cognizance of regional variation technological developments in agriculture and Government strategies for agriculture development.

3. Taking into account of input (cost of cultivation for production of the crop) and output relationship (value of output of the crop), cropwise estimation of credit requirements has been done.

4. While estimating the projected demand for credit for the year 1989-90, 1994-95 and 1999-2000, the Committee have estimated the balance outstanding (i.e., stock) of advances as at the end of the year and not the amount of loans expected to be issued (i.e. flow) during the year. This methodology would help to compare the demand for the credit and the resources available with the banks. Based on the above methodology, the Statewise financial requirements for all crops have been estimated.

TABLE No. 12

Financial Requirements For All Crops Tamilnadu

(Rs. in crores)

	1989-1990		1999-2000	
	C1	C2	C1	C2
Tamilnadu	2408	2774	3008	3465
All India	29464	36011	49356	60324

Source: ACRC Report Table 29 Page 819

C1 : Cash and kind expenditure

C2 : Cash and kind expenditure plus computed value of family labour

TABLE No.13

Credit Requirements for Agricultural Production System (APS) and Agricultural Input Distribution system (AIDS) For All India

(Rs. in crores)

	1989-90	1999-2000
APS		
Crop Production	8861	23888
Livestock	772	1185
Fishery	60	200
AIDS	177	478
Term Loans	11717	27581
Total	21587	53332

Source: ACRC Report Table no.59 Page 852

Table 12 and 13 show the financial requirements for all crops for Tamilnadu and Agricultural Production System (RPS) for India respectively.

AIDS: Agricultural Input Distrution System.

Estimation by Lead Banks:

For the formulation of District Credit Plan, Reserve Bank of India[4] have issued guidelines and directed the Lead Banks to work out credit requirements for Short Term and other schemes (Medium Term and Large Term) under Agriculture. Following methodology is being followed:-

1. Micro-level Planning:

District was taken as unit of planning. Blockwise estimation has been done for crop loan and other activities allied to agriculture and then aggregated to arrive for the district. The above method was followed upto 4th round of District Credit Plan (upto March 1989). Subsequently, after the introduction of Service Area Approach, village has been identified as unit of planning and for each village, the respective service Area Bank Branch has to estimate the credit requirements based on the potential of the villages for which Village Profile format is being used.

Estimation of credit requirements at the grass root level i.e., village by the Lead Banks appears to be more scientific and realistic when compared to methodologies referred to early.

2. Task Force for estimation of credit requirements:[5]

Under the Lead Bank Scheme, a task force consisting of representative from Cooperative bank, Lead Bank, RRB. Govt., Departments, RBI and NABARD has been constituted at the District Level and they were expected to take care of the following for estimation of crop loans.

a. Farm extension programme

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4 Lead Bank Scheme - District Credit Plans - New Guidelines, RBI, Bombay March 1979.
5 ibid 4

b. The preparedness of the farmers

c. Usage of modern inputs

d. past experience of the bank in the sphere of crop loans

e. recovery trend

f. availability of fertilizers

3. Estimation of Crop-Loan (Financial requirements):[6]

The estimate has to be arrived at on the basis of the gross cropped area under different crops in the district taking note of the break up into irrigated and unirrigated area. The possible increase in cultivable area and the likely changes in the cropping pattern in the district use of High Yielding Varieties should be taken note of. The scale of finance for each one of the crops, approved by the District level Technical Committee (convened by Cooperative Bank) is applied for estimating the financial requirements for crop cultivation.

Area under Crop A Scale of finance for Crop-A = Financial requirements for the Crop A

4. Graduation - Credit Requirements:

Since a portion of the outlay on cultivation is met by the farmers, particularly bigger farmers, from their own resources and not all the cultivators would go in for the recommended doses of fertilizers and pesticides which constitutes the kind portion of the scale of finance, the short term credit requirements for agricultural production to be met by institutional agencies may be taken at around 50 per cent of the total cost of cultivation in the district.

5. Credit Gap:

The difference between the estimated credit requirement thus arrived at and the total of allocations accepted by the different lending institutions in the district indicates the gap in the crop loan availability from the institutional sources. Banks were expected to strengthen their organisational set up for this purpose.

Since the introduction of Services Area Approach, the credit requirement for each one of the village is taken care of. Based on the above methodology, the Lead Banks in the country have prepared Annual Action Plan and launched in 435 districts. The aggregated position for All India is furnished below in Table 14.

TABLE No.14

Target and Achievement under AAP. All India

(Rs. crores)

Sector	AAP 1984		AAP 1985	
	Target	Achievement	Target	Achievement
Agriculture	5063.06	4972.95	5499.10	5659.34
SSI	1000.84	1162.22	1195.69	1561.34
Services	974.96	1528.89	1234.37	1868.38
Total	7038.86	7929.16	7929.16	9089.53

Source: Annual Report - RBI.

[6] Ibid 4

TABLE No.15

Estimation by Lead Banks for Tamil Nadu

(Rs. crores)

Activity	AAP 1988 (Jan.-Dec.) Before the introduction of SAA-Block/District as unit of planning.		AAP 1989-90 (Apr.-Mar.) After SAA introduced with village as unit of planning	
	Target	Achievement	Target	Achievement
Agriculture				
ST/crop loan	626.37	765.41	683.38	848.05
MT & LT	73.84	297.94	344.45	307.82
Total agriculture	900.21	1063.35	1027.83	1155.87
SSI	241.79	229.95	276.88	278.87
Services	262.93	302.90	287.07	296.15
Total	1404.93	1596.20	1591.78	1730.89

Source: Background materials for SLBC meeting June 22, 1989 and Sep '90

It could be observed from tables 14 and 15 that credit estimated (to be met by the banks viz. Commercial Banks, RRBs, Cooperatives) under AAP 1988 and 1989-90 has been, exceeded when the banks have actually participated both at National and State level. The percentage of achievement under crop loan in the State was very good being 124%. The estimated credit requirement, after the introductory of SAA, is higher by about 200 crores. Let us compare the two estimates by Lead Banks and ACRC.

Estimate by ACRC for crop loan in Tamil Nadu (outstandings)		89-90 Estimate of Lead Banks for crop loans in Tamil Nadu (Flow or disbursals) 89-90	
Financial requirements	- Rs.2774 crores	Estimation	- Rs.639 crores
Credit requirements (Assumption 50%)	- Rs.1387 crores	Supply	- Rs.848 crores

Source: ACRC Estimate, ACRC Report, Table 29, page 819

While we compare the two estimates, following difficulties have been experienced.

1. ACRC estimates indicate the stock position that is to say the credit requirements indicating the demand and current overdues. Flow or disbursal is not indicated. Whereas in the estimates, prepared by Lead banks under AAP, only flow or disbursements to be made during the reference period is only indicated. Hence there is a difference between the two estimates.

2. Further, crop loan targets are always exceeded by the banks in the State. A comfortable supply of credit from the banking

system indicates that there is no constraints in the resources. However, sizeable portion of crop loans in the form of Jewel loans, being given without any serious relationship between size of holding and amount of loan sanctioned needs further probe, if we want further perfection in the estimation exercises under Lead bank methodology.

3. Yet another difficulty in adopting the Methodology for the estimation of credit requirements, as suggested by RBI for the lead banks, is a degree of accuracy in the various steps for the estimation; because the accuracy largely hinges on two factors viz.

a. Availability of data in Micro level/ Village level, required for the estimation exercises as per the requirements and

b. Involvement and skill of the branch managers' in the estimation work as per the guidelines given by RBI under SAA.

With all the limitation, the estimated credit requirements done by the lead banks, may give a better magnitude of rural credit in the state.

PART III
Issues and Suggestions

1. Impact on the Economy

Although we have seen a good and continuous performance of the banking system particularly in rural areas, over a period of time, it only indicates the quantitative performance. But quality dimension of lending is far from satisfactory. In this context, the finding of a study team[7] is relevent. The findings of these studies threw up a major deficiency in the rural credit system viz. weak link between bank credit and production, productivity and income levels. Scattered lending over wide area diluted the quality of lending. In order to improve the quality of lending, 'service area' approach has been introduced with the main emphasis of grassroot credit planning at the branch level for each one of its service area villages.

Magnitude of Task of Micro level Planning

Issue

Formulation of credit plan as per the methodology suggested for 6 lakh and odd villages by about 42000 and odd branch managers may not be a tall order. But it is the question of skill on the human resources available for doing the planning exercise and adequacy of training for it.

For this exercise, volumenous data are to be collected and scientifically intrepreted. Many of the bank managers are not familiar and so far they are trained for bank management and not for development management in a given unit of area i.e. villages, through credit. Many of the village credit plans are not prepared as expected. Another dimension of the problem is the accuracy of available data. In this regard, ACRC report points out "the quality of statistics affects the quality of credit plan".

Suggestions:

1. A continuous training programme, motivation and incentives for rural posting, a peripatetic pedagogical team for on the spot guidance to the Bank Managers may be considered.

2. Data Bank at the District/Block level with computer facilities may be opened and villagewise profile may be kept and periodically updated. In this regard, ACRC reports highlights "unless the concerned departments and the banks realise the value

[7] At the instance of RBI, The chairman of public sector banks undertook a countrywide study on rural lending in Nov./Dec. 87.

of accurate statistics for* planning are set about compiling reliable time series; the credit plan estimates on these statistics cannot but be tentative"[8].

In view of such importance of the micro level data in the context of decentralised planning and village level credit planning under Service Area Approach, National Bank for Agriculture and Rural Development (NABARD) who has started opening **District level office** could think of creating a data bank with computer facility, associating with the concerned head bank and the District Collectorate.

2. Lack of Infrastructure facilities:

Issue:

Bank credit, 'per se' cannot bring total development. It canonly acts a catalytic agent for accelerating the development. Many villages lack basic infrastructure - Road, Transport, Power etc. Besides, we have about 60% of people as illiterates. Due to lack of adequate infrastructure many schemes could not be implemented successfully. It also affects the economic viability ultimately resulting a bad recovery of bank loans.

Suggestions:

Hence, in order to make the bankable schemes viable and to bring any tangible impact of credit input on production front, a suitable non-credit input plan (forward and backward linkages) may be prepared and efforts should be taken to see the credit input and non-credit input go together to bring out the desired impact.

3. Poor impact on the poor and quality of lending

Issue:

Although financial and physical targets are reached under poverty alleviation programmes like IRDP, SEPUP etc., many evaluation studies point out that many of the units financed under the above programmes were sick and sale of assets created out of bank loans due to nonviability have become a common phenomenon. This indicates that lack of sustainability of the poor at the above poverty line. Hence many of the poor are not able to go above the poverty line and some of those who have gone above the poverty line are falling back or returning to their original level (i.e. below poverty line). Further, it has been pointed out that quality of Bank's lending should be increased.

Suggestion:

First, we must arrange to make the 'poor creditworthy'9 and increase the credit absorbing capacity of the area of lending. This could be possible only if the inputs other than credit that is to say, the adequate infrastructural support, should come first and credit should follow. In this context, ACRC emphasises the need for a District Development Plan indicating the plan for infrastructure development for the district and district credit plan should be dovetailed into the plan. That is to say, at the village level, village development plan (VDP)[10] may be prepared showing both infrastructure development and credit required for individual development schemes. This credit

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* ACRC Report (1989) Page 419

At the district level, NABARD will open its representative office, manned by its representative designated District Development Manager to supervise and coordinate for successful implementation of Service Area Approach

9 Pulley Rober V.A case study of IRDP in India World Bank. Discussion paper 58. The World Bank Washington D.C.1989

Rengarajan V. - 'Making poor credit worthy' - Monthly News Review - August 1990, Indian Overseas Bank.

planning and development planning should go together and linked with horizontally and vertically at all levels. This would go a longway for increasing credit absorbing capacity of the area and consequently making the poor credit worthy. Further towards increasing the quality of lending, two suggestions are made.

1. Firstly, the existing target, fixed at national level for the commercial banks, as given in Part I, may be dispersed with as it does not consider the regional realities and requirements. In this regard Dr.N.K. Thingalaya makes a plea, in his article[11] to avoid adhocism in fixing the credit targets. He strongly suggests "Target approach should be replaced by realistic estimation of the need based credit requirements of various segments of the rural economy. In view of implementation of the Service Area Approach, a suggestion is made by him to use the aggregation of the village credit plans as the target for credit expansion in the rural area, I fully endorse his view as this would facilitate the banks to concentrate rural areas with a planned deployment of credit at the grass root level (Village Credit Plan) and help to increase production and productivity which is an aspect of quality dimension of lending.

2. Yet another suggestion for improving the quality in Bank's lending, is to periodically evaluate the impact of Village Credit Plan, prepared by the banks on production, productivity and income level in their service areas. For this, evaluation department/ mechanism in the banks should be geared up for conducting evaluation studies on an ongoing basis.

Further, in view of making the banks and concerned development department effectively involved jointly for bringing some impact on production in a given unit of area, 'Production Target' may be given to the above agencies (Banks and Agricultural Department as credit and non-credit inputs (Fertilizer, Pesticides etc) are responsible for production) and this should be monitored at Block level in Block level Banker's Committee meetings (BLBCs) which is constituted under Service Area Approach to monitor the implementation of credit plans.

In this context, Khusro Committee[12] has emphasised the need to have 'audit of development performance'. The report remarks in a development approach, a banker is judged not so much, by how much he lent, how well kept the accounts and how thoroughly the rules and procedures, but how much he succeeded in changing the economy of the customer and socio- economic face of the region. In such a development banking, an audit becomes not an audit of accounts but an audit of development performance.

4. Poor Recovery Performance:

Issue:

Poor recovery or overdues of bank loans seem to be an all pervasive phenomenon and is neutral to the all types of credit institutions and also to the regions. According to ACRC report that the overdues at the end of 1985-86 amounted to Rs.4262 crores in aggregate in the three streams of the credit system viz CB, RAB and cooperative banks.

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11 Dr.N.K. Thingalaya "Target Approach in Rural Lending" Pigmy Economic Review, Monthly Economic journal of Syndicate Bank, August 1990 Vol. 36 No.1

12 ACRC Report (1989) Page 435.

TABLE No.16

Overdues of the Banking System in India

Agency	1985-86 (Rs. crores)
Commercial banks	1744 (43)
RRBs	413 (51)
PACs	1807 (41)
LDBs	298 (39)
Total	4262

(Figures in bracket indicate % of OD to Demand) Source: ACRC Report.

TABLE No.17

Sectorwise percentage of overdue position in Tamilnadu

Sector	June 1988	June 1989
Agriculture	36.37	37.36
SSI	61.78	63.82
Services	49.43	50.82
Total	42.62	43.78

Source: Background material for State level Review meeting - Tamil Nadu - SLBC - IOB, Madras. Sep. 1990.

Tables 16 and 17 indicate the magnitude of overdue position for the banking system (Agencywise) in India and Sectorwise in Tamil Nadu respectively.

In All India, the overdue position in Agricultural Sector remains continuously around 45% to 50% which is causing concern to the banking system. In principle the bank loan, which is lent out of the funds mobilised from the public as deposit, have to be necessarily recovered irrespective of the sector or clients. An experienced banker[13] has succinctly remarked, "The success of any Government sponsored scheme should be measured not by 100% disbursal but by 100% recovery".

Secondly, a better recycling of funds by way of better recovery of old dues, is essential for sound financing in rural areas; because of poor recovery, the recycling of funds is chocked.

Suggestion:

1. During pre sanction period - correct appraisal, presanction visit to the spot, adequate loan, strict adherence of proper scrutiny of documents are all to be scrupulously followed by the banks.

2. During post sanction period close follow up and proper monitoring should be done by the banks.

Kallapiran T.R. 'Slogan for the Decade' - 100% recovery' Monthly News Review - special issue on Recovery - August 90 (IOB).

3. Recovery camps may be organised jointly by the banks and Government agencies should be done periodically.

4. As we have number of targets for lending to various sectors and sub sectors, recovery targets may be fixed for each bank if necessarily jointly for the bank and the Government agency.

5. Provision of adequate supporting facilities by the Government Department would also make the scheme viable ultimately resulting a good recovery.

5. Planning:

Issue

Decentralisation is immediately required in planning arena. District level planning is an immediate prerequisite for development work. Since the banks are doing microlevel credit planning exercises (village level) many times difficulty was experienced, and more importantly proper devetailing the credit planning with the development plan of the Government is not possible. Ultimately, many schemes, for which provision of credit has been made in the credit plans, could not be successfully implemented for want of adequate supporting facilities from the Government.

Suggestion:

It is understood on experimental basis, decentralised planning exercise is being carried out in selected 5 districts in India. In Tamil Nadu, Tirunelveli Kattabomman District is one among the five districts where District level planning exercise is being carried out.

In addition to this, in two more districts viz. Thevar Thirumaganar and Nilgiris, the decentralised planning is being undertaken on a pilot basis.

This exercise at the district level would go a long way in bringing out a comprehensive district development plan which is a prerequisite for the preparation of District Credit Plan as frequently pointed out by Reserve Bank of India. Therefore it is suggested:

1. The District Planning exercise is to be undertaken in all the districts and for this District Planning Cell/Dept. may be created in each district.

2. The respective Lead Bank and NABARD (District level) may be involved in the exercise at the District level:

3. District Development plan with the component of Institutional Credit Plan (Block wise) may be prepared for the district.

4. As a part of district level planning exercise, villagewise data may be collected and computerised at the District level for reference and easy access to the Bankers.

ANNEXURE 1

Scheduled Commercial banks - Offices in India as on 30.09.89

Sl.No.	State/U.T.	No. of Branches
1.	Uttar Pradesh	8038
2.	Maharashtra	5394
3.	Bihar	4494
4.	Andhra Pradesh	4474
5.	Tamil Nadu	4212
6.	Madhya Pradesh	4202
7.	Karnataka	4181
8.	West Bengal	3864
9.	Gujarat	3284
10.	Rajasthan	2929
11.	Kerala	2815
12.	Punjab	2111
13.	Orissa	1889
14.	Haryana	1250
15.	Delhi	1111
16.	Assam	1087
17.	Jammu & Kashmir	744
18.	Himachala Pradesh	670
19.	Goa	256
20.	Tirupura	157
21.	Megalaya	143
22.	Chandigarh	112
23.	Pondicherry	69
24.	Nagaland	68
25.	Manipur	64
26.	Mizoram	63
27.	Arunachala Pradesh	60
28.	Sikkim	26
29.	Andaman-Nicobar Islands	21
30.	Daman & Diu	10
31.	Dadra & Nagar Haveli	7
32.	Lakshadweep	6
	Total	57811

Source: Banking Statistics - Quarterly Handout - Sept. 1989 RBI, Bombay.

ANNEXURE II

Districtwise/Sectorwise Banking System's Performance in Tamil Nadu

(Amount in Rs.Lakhs)

Sl. No.	DISTRICT	Allocation (ACP April 89-March 90) Agriculture	Small Industries	Services	Total	Achievement Agriculture	Small Industries	Services	Total	% of Performance Agri-culture	Indus-tries	Serv-ices	Total
1.	Chengai Anna	5918.61	3222.04	2263.17	11408.82	*6345.29	*2798.28	*2237.86	*11381.93	107	87	99	100
2.	North Arcot (Composite)	8460.50	2069.00	2484.56	13014.06	9664.54	2207.30	3641.53	15513.37	114	107	147	119
3.	South Arcot	1064.46	708.03	1109.14	12281.83	*9325.49	*248.38	*699.18	*10273.05	89	35	63	84
4.	Dharmapuri	4836.71	1042.44	1133.18	7017.33	4604.35	948.37	2331.18	7883.90	95	91	205	112
5.	Salem	9554.00	1842.84	5289.75	16.686.59	10815.33	1733.33	5581.17	18129.83	113	94	106	109
6.	Periyar	7931.16	2920.27	1892.03	12743.46	8629.30	2999.69	2693.63	14322.62	109	103	142	112
7.	Coimbatore	6770.17	4762.30	2579.43	14111.90	10611.63	6693.72	1818.75	19124.10	157	141	71	136
8.	Nilgiris	1688.97	382.56	485.11	2556.64	1549.16	106.41	355.92	2011.49	92	28	73	79
9.	Madurai	6500.81	1477.49	2045.70	10024.00	7514.20	1132.77	1287.62	9934.59	116	77	63	99
10.	Dindigul Quaid-e-Milleth	4254.92	1215.57	650.16	6120.65	4118.00	348.93	436.55	4903.48	97	29	67	80
11.	Tiruchirapalli	8091.41	2371.09	2858.77	13321.27	8315.61	1839.47	2247.54	12402.62	103	78	79	93
12.	Thanjavur	7994.66	566.76	1275.05	9386.46	9828.17	512.91	1135.30	11476.38	123	91	89	122
13.	Pudukottai	2754.59	534.64	394.97	3684.20	3290.67	371.94	347.35	4009.96	119	70	88	109
14.	Ramanathapuram	1650.37	314.82	426.17	2391.36	2013.13	397.05	380.31	2790.49	122	126	89	117
15.	Pasumpon T.T.	2370.85	225.90	454.26	3051.01	2834.26	269.20	300.63	3400.09	120	119	66	112
16.	Kamarajar	3283.77	2301.42	885.07	6470.26	3946.50	3364.12	968.55	8279.17	120	146	109	128
17.	Tirunelveli Kattabomman	4265.33	628.33	826.33	5719.99	5109.52	625.61	1013.99	6749.12	120	99	123	118
18.	Kanyakumari	2964.33	506.50	589.46	4060.29	3180.62	520.59	557.07	4258.28	107	103	95	105
19.	Chidambaranar	3027.39	596.73	1055.07	4679.19	3891.34	769.24	1581.10	6241.68	129	129	150	133
	Grand Total	102783.21	27688.72	28707.38	159179.31	115587.11	27887.81	29615.23	173090.15	112	101	103	109

* Achievement data is provisional

Source: Background material - 49th State level Review Metting for Tamil Nadu September 1990. SLBC IOB.

ANNEXURE III

chemewise Banking System's Performance in Tamil Nadu
(April '89-March '90)

(Amount in Rs. lakhs)

Sl. No.	Scheme	Allocation under ACP No.	Allocation under ACP Amount	Achievement under ACP No.	Achievement under ACP Amount	%of Performance
	Crop Loans					
1.	Paddy	475821	24420.49	645747	25802.30	106
2.	Oil Seeds	90410	4912.12	96809	3877.52	79
3.	Sugarcane	94992	7161.78	175702	9955.97	139
4.	Vegetables	110	3.65	86	2.13	58
5.	Pulses	2779	26.17	4501	223.82	855
6.	Other Crops	687996	31813.57	960418	44943.96	141
	Total Crop Loans	1352108	68337.78	1883263	84805.70	124
	Term Loans					
1.	Minor Irrigation	72741	6256.67	42548	4265.34	68
2.	Farm Equipments	44369	6598.46	19427	5142.48	78
3.	Other Purposes	72711	4777.91	82596	5815.46	122
	Total Term Loans	189821	17633.04	144571	15228.28	86
	Allied Activities & Agriculture					
1.	Dairy	166721	7550.10	124224	5357.02	71
2.	Poultry	10988	1208.67	12444	1528.34	126
3.	Others	147848	8053.62	159337	8672.47	108
	Total allied activities	325557	16812.39	296005	15557.83	93
	Total agriculture & Allied activities	1867486	102783.21	2323839	115587.11	112
	Rural Artisan & Cottage & SSI	129060	27688.72	113762	27887.81	101
	Trade & Services	408992	28707.38	382188	29615.23	103
	Total Priority Sector Advances	2405538	159179.31	2819789	173000.15	109

Source: Background Material. State level Review Meeting for Tamil Nadu SLBC Sept. 1990 IOB.

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Summary of Discussion

Mr.V. Rengarajan presented the paper on "Rural Credit System for Agriculture And Rural Poor In Tamil Nadu". In his opening remark the Chairman Dr.T.K. Velayutham mentioned that the problem of effective management of rural credit remains unresolved despite a spate of committees and commissions have been effected on agriculture and agricultural credit.

The paper was organised in three parts, viz., the structure of rural credit system in Tamil Nadu, the estimation and the methodology of total credit requirements of the State and the issues arising out and the suggestions thereon.

The author credited the successes story of the commercial banks especially, the RRBs in Tamil Nadu to their "service area approach" based on the micro-level planning at the village level. The author opined that through this approach with the emphasise on the gross-root credit planning at the branch level for each one of the villages, the lacuna in the rural credit system namely the lack of qualitative improvement in disbursing credit to needy people can be rectified. To this end, the author pointed out the development of human resource through continuous training of the personnel, effecting a mobile team to provide on the spot guidance to the managers and an adequate data-base at call are some of the directions that can help improving the qualitative aspect of credit. Only with adequate information on the target group, the banks can plan improving the 'viability rate' of the credit schemes through identifying non-credit requirements of the target group. Once the non-credit component is identified the non-credit input plan can be drafted and by providing the assistance required through joint efforts at district level with the micro-level planning at the village level, the gaps can be rectified and schemes can be made viable. Agreeing on the suggestions of the Khusro committee, the author called for the audit of development performance rather than audit of accounts can help a long way in transforming the bank management into development management.

The author was in favour of the recommendations of the Khusro committee towards the problem of poor recovery rates of the rural advances. The recommendations were in the lines of enacting and enforcing revenue recovery with joint efforts of the district planning cells as well as the bank management.

Opening the discussions on the paper, one of the participants raised a clarificatory question as to whether there is any discrimination in the system of credit between the development of industry and agriculture. The response was that despite the fact that agricultural credit was the forerunner to be operationalised to that of the latter, the former had set back because of the failure of the co-operative movement. Recognising the failure of the efforts on the agricultural front to produce any trickle down effect, the commercial banks launched direct attack on improving productivity not only in agriculture but also in subsidiary occupations of the sector. It was made clear that there is essentially a divergence in methodology between the two but no in the objectives.

Another participant draw the attention to the very high recovery rate achieved by the Gramin Bank of Bangladesh and whether improvements can be made on those lines of the Bank. The reply was that the high rates of recovery performance of that bank is to be seen in the context of the size of the country itself as well as the group lending scheme with the active participation of the non-formal institutions prevailing in that country.

In his concluing observations the Chairman raised the question that given the task of rural development whether the existing (number of) branches of commercial banks can really cope up with the task. It was also pointed out that the "repayment ethics" are corroded by the loan waiver strategies loaded with political calculations which tell upon the performances of the commercial banks in the realm of rural development. The Chairman stroke a note of caution on the extent of decentralisation of the bank management and instead, called for depolitisation of the rural credit system as the need of the hour.

S. Thirumalai Velayutham

Some Aspects and Facts of Inflation in India*

Inflation and levels of Price rise

At what point does a general price rise become inflationary? In a developing economy like India, where the supply of goods and services at the trend rate of 3.5 to 4 per cent will always be somewhat short of demand and where the supply of money will be increasing at the trend rate of 8 to 9 per cent, is there a point of tolerance for the price rise beyond which the price rise is termed as inflation. There is the view that there should be no price rise at all, that the economy should be marked by zero inflation. This will be possible in a static state where the supply of goods and services (and the production apparatus of consumer, intermediate and capital goods behind it) is adequate to meet the demand for them - demand as understood in the strict economic sense of a need backed by purchasing power to meet that need, as well demand in the social sense of people in need but for lack of purchasing power, waiting far behind in the queue. But for a developing country like India where a system of priorities imposes limits on the production and supply of most goods and services in general demand, on the basis of the short 40 years experience of planned development[1], a 5 per cent annual price rise can be taken as the margin of tolerance, beyond which the process of inflation may be said to set in.

Inflation and Money Supply

There is a relation between the volume of money supply and prices - though it is not a linear one, as the quantity theorists of old and the monetarists of today assume. Every year the Reserve Bank has had to regulate the quantity of money and credit, which is classified into broad money called M_3 and narrow money M_1[2]. The instruments taht it has used for this purpose are the Cash Reserve Ratio and the various arrangements for credit flows and restraint during the busy and slack season. These are necessary instruments to regulate the flow of money, though there are occasions when because of the somewhat harsh nature of the regulations and their limited cash resources, the banks overlook these directives. Here it is important to bear in mind that the RBI's instruments are additive and supplementary, because year after year their use has not been able to stop inflation rates rising well above the 5 per cent tolerance limit referred to earlier. Taking into account the Ratchet effect that once prices go up, they never come down, annual inflation is cumulative - that is, it is 1985 86's average

* A note by Dr. Malcolm S. Adiseshiah for the chapter for the book on inflation. Financial Express, New Delhi, July, 14 1990

7 per cent rise on top of 1984-85's 6 per cent rise, the 1986-87's 7.2 per cent is on top of this 6+7 per cent, and the 1987-88's (the drought year) 10 per cent is on top 6+7+7.2 per cent and so on[3]. This does not mean that the RBI should not use all its instruments to control the liquidity of the economy, but they are mainly supplementary to other instruments to be referred to later.

Inflation and wage goods prices

Inflation rates, whether high or low, have a much greater impact on the prices of wage goods than on all goods taken together. This is recorded every year. 1982-83 recorded a low average inflation rate of 2.5 per cent, but the price rise of food and primary articles was 3.7 per cent. In the following year, 1983-84 the whole sale price index for primary food articles rose by 13 per cent which was 60 per cent of the overall index of 9.5 per cent for the year, - this despite the bumper food crop of the year. The same story repeats itself in 1984-85, where against the average wholesale price rise of 7 per cent, price of essentials were double that rate - despite high and mounting food grain stocks, in 1985-86 when the wholesale price rise was 7.8 per cent, the price of cereals rose by 11.8 per cent, of fruits and vegetables by 19.2 per cent[4]. In this connection, RBI points to the double dilemma which, it states, it cannot explain - about the inflation of cereals price in a situation of bursting buffer stocks, as well as the fact that the price rise of rice for example is not due to the rise in its issue price which was made in October 1985 while the 12.4 per cent rise in its prices occurred before, between March and September 1985: similarly the continuous rise in the price of wheat since July 1985 by 10.5 per cent was before the rise in its issue price in January 1986[5]. This record of the price rise of wage goods outstripping the general inflation rate continued to be registered in 1986-87, 1987-88 and 1988-89 and 1989-90. There are two pointers to the government on this. First this record of the prices of essential goods rising faster than the general price index is a persistent long term phenomenon and results in increase in real inequality - real inequality being defined as inequality expressed in size class expenditures in current prices after deflation by the price index. An analysis of the NSS data, particularly the 24th, 25th, 28th and 32nd rounds shows that real inequality declined at a much lower rate than inequality expressed in current prices, so that governments committed to alleviating poverty should not be led astray by percentage decreases of those below the poverty line computed on the basis of current prices, but should damp down and counter inflation which is essentially inegalitarian. The second pointer is that the government and RBI must take action to prevent the continuous and unequal rise in the prices of wage goods and not throw up their hands as the government does repeatedly in Parliament and RBI in its annual reports as this being an inexplicable puzzle. It is explicable, and calls for action not only for a streamlined functioning of PDS, but also for action against speculators, hoarders and the black money purveyors,6 on which so far mere verbal threats are being held out.

Inflation and Governmental Responsibility

Analysing the inflationary situation and its causal factors, one is driven to the conclusion that in money creation and expansion, the role of the Reserve Bank is marginal and consequential to decisions taken by the Government. Studies by the Reserve Bank itself (1982 and 1984) reveal the limited nature of its control instruments, of the more decisive part played by the supply - adequate or inadequate - of goods and services than that of money and credit, of the conventional RBI control instruments - the Statutory Liquidity Ratio being merely an indicator of the direction of credit flows and the Cash Reserve Ratio as the indicator

of ceilings on credit creation by the banking net work, which, as noted earlier, is ignored by the banks when they find the controls too rigid in relation to their requirements[7]. On top, there is vital function of monetary policy which is to promote increased production, which has been ignored in all this concern about inflation control, and the varied and unpredictable movements of foreign remittances and the foreign exchange reserves maintained by RBI. The real control of monetary policy is in the government through its long term and annual decisions on a) bank financing of food and other procurements and buffer stocks, b) the proirity sectors and the amount of credit (40 per cent) that must flow into them, and c) the reserve money created by the RBI and other banks credit to the government: in 1981-82 the union and state deficits financed by RBI was Rs. 2413 crores, in 1982-83 Rs. 2741 crores plus the loan assistance of Rs. 1743 crores to the states, in 1983-84 Rs.2095 crores onto the 1989-90 union budget deficit of Rs. 11,750 crores, with increased RBI credit to the Union government shown in the 1989 - 90 revised budget at Rs.14,300 crores. In addition to the above deficit budgets, there is deficit financing which includes other banks credit to government (in addition to the Union budget deficit) which stands in 1981 - 82 at Rs.2413 crores as RBI credit to the union and states + Rs.3572 crores from other banks, totalling Rs. 5985 crores, in 1983-84 Rs.2741 crores + 2522 crores, totalling Rs.5264 crores. In 1982-83 Rs.2108 crores + 2134 crores, totalling Rs.4242 crores and so on for subsequent years[8]. These RBI and other banks credit to government contributes the main source of Reserve Money in the economy which has a 3-4 times multiplier effect on the total money and credit supply in the economy and is the major monetary force for inflation. The annual average growth of reserve money in M_1 and M_3 with a large currency component, was 18.6 per cent in the first four year of the Seventh Plan, recording reserve money's contribution to change in money stock. At the same time, the large currency component seen in the fact that in the first 4 months of 1989-90 notes circulation rose sharply by 13 percent[9] means that the banking sector's scope for influencing credit creation is reduced. The only way to regulate and control this source of inflation is the acceptance and strict adherence by the government of the recommendation of the Report of the 1986 (Sukhumoy Chakravarti) committee to review the working of the monetary system[10]. That recommendation is for the government a) to make known the amount of deficit financing at the time of the budget presentation. b) in consultation with RBI to establish the ceiling of money creation for the year and to follow it strictly. Though this was stated by government in parliament to be accepted by it, the government has not established such monetary ceilings for each year, and so has not followed up this important decision. There must be annual ceiling for money creation established by the government and RBI and they must be adhered to. Behind this recommendation, are a number of issues in the government budget which are related to the inflation factor.

Inflation and Administred Prices

The rising of administered prices which has taken place every year from 1980-81, and usually before the budget session of parliament so that it (parliament) has no control over them, is an inflationary force. The administered prices system covers 4 groups of commodities and services: a) material input items like steel, coal, fertilisers, petroleum, aluminium and paper; b) infrastructure service like railways, posts and telegraphs and shipping: c) consumption articles like rice, wheat, coarse grains, sugar, edible oils, and drugs; and d) support prices for pulses, oil seeds, jute, cotton, sugarcane and rubber. The first two groups of commodities are vital inputs into industrial and agricultural production processes, so that

changes in their prices have a pervasive influence on the direction of prices. In fact a study of the impact of the administrative price changes in these two groups in 1987-88 shows that the rise in administered prices at 12.4 per cent is higher than the 8.3 per cent recorded for the general price increase[11]. The reasons adduced for the rise in administered prices are :a) the increase in production costs, b) internal inflationary forces, c) the need for additional projects, and above all; d) the need to mobilise resources for the economy without resort to additional taxation. The impact of the increase in administered prices which forms 17 per cent of the whole sale price index is largely negative in that it distorts production plans of firms, of subsectors and sectors, produces monopoly profits and acts as a disincetive to private investment. It is thus essential that administered prices increase of groups (a) and (b) should not be resorted to meet a rise in production costs as such costs can and should be absorbed by improved efficiency, as promised by the government[12]. If there is to be an increase in administered prices, it should be tailored so as not to be borne by the poor majority and not cause a rise in general prices.

Inflation and Government and Balance of Payments deficits

Government deficits which are an important source for the creation of reserve money and which in turn causes inflation, as noted earlier, need some further attention. Within the system of government deficits - budgeted, financial, union and states combined - a worrisome feature is the post 1980-81 emergence of a yawning revenue deficit. Before that, since the formulation and execution of the First Plan, only twice, in 1971-72 and 1972-73 because of Indo-Pakistan war, was there a revenue deficit. Now it looks as if we are caught in a revenue deficit trap[13]. In the 1989-90 budget the revenue deficit stood at Rs. 12,436 crores and for 1990-91 is budgeted at Rs.13,032 crores. This is a trend rate of growth of 42 per cent. The revenue deficit in turn was caused by the exploding non plan expenditure (which rose in 1986-87) by 13.8 per cent against the Plan increase proposed at 6.86 per cent, in 1987-88 by 19 per cent against the plan increase of 4.1 percent, in 1989-90 by 22 percent against the plan increase of 3.2 per cent . This exploding non plan expenditure is the result of the continued rising defence expenditure, administration and staff expenditures, subsidies and interest payments. The question has been raised as to whether, if there was not this increasing deficit and market borrowing, there would not be increases in taxation and administered prices, which will have an equal - if not worse - impact on prices. That is why attention is concentrated on the revenue deficit an on the non plan non development expenditures which government must reduce sharply to control inflation. Further revenue deficits reduces the resources available for the plan and involves use of capital receipts for financing the revenue deficits. Nothing is more urgent for the control of inflation than a speedy and sizable reduction in the revenue deficit. As yet, except for some adhoc decisions to cut public expenditures across the board by 10 per cent (which applied indiscriminately will affect production and development) and some reduction in foreign exchange expenditure through reduced foreign travels and closing of some offices abroad, there is no concerted move to cut non development costs. That is one anti inflationary action needed.

The effect of the Balance of Payment deficits, which have become endemic in the 80s (from -Rs. 2317 crores in 1981-82 to - Rs.6000 crores in 1988-89)[14], on inflation is multipronged. In so far as it stems basically from an excess of imports over exports, it has a deflationary impact as it has a contracting effect on M_1 and M_3. In so far

as the deficit is met by a)external concessional loans called aid, b) drawings from IMF and c) allocation of SDRs, there is an inflationary current released as all three sources add to the money supply - M_1 and M_3. In so far as the deficit is met by drawing on the country's foreign exchange reserves, there is a feflationary effect. In this context the depreciating rupee has an inflationary effect as it stimulates exports more than raising the cost of imports. In the end what is needed is for the government to help make the adjustments of the economy which will lower costs and prices and stimulate exports, which in turn will be balanced by needed imports to avoid the inflationary impact of a too fast rising value and volume of exorts - as Japan is experiencing.

Inflation and Distributional facets

There are some inflationary developments which are not explainable through the normal supply-demand balance equation. During 1986-87 as earlier noted, the whole sale price index covered around 5 per cent, which is the tolerance level indicated at the start, despite the demand side expanding - with M_1 increasing at 17 percent and M_3 at 18.5 per cent. The reason for this increased money supply not being reflected in the rate of inflation is skewed distribution of incomes, seen in the large numbers (200 million according to government, 300 milion according to my studies) living in poverty and not being able to purchase the necessities that they and their families need, as well as the growing role of black money, which nearing 45 per cent of GNP. is able to absorb underground what the poor masses cannot afford, and the flight of capital to foreign tax shelters as documented in part by the IMF staff study. 15 which absorbs a part of the increased M_1 and M_3 and leads to relative stagnation of savings and the increased consumerism of the top and upper middle classes. Another similar incident is the slow rise of 1.7 per cent of the wholesale price index in the first quarter of 1988-89 which was ascribed to: a) the 1987-88 drought, which is not true as the earlier 1982-83 drought. was followed by a 4.8 per cent in 1983-84 first quarter price rise, and the 1979-80 drought by an even sharper 7.4 per cent 1980-81 first quarter price rise: b) the good management of the economy, which is not true as the demand side showed too much liquidity in the economy and the supply side severe scarcities which had to be corrected by imports: and c) the good 1988-89 south west monsoon, which again is not correct as a similar good 1980-81 south west monsoon, was accompanied by a 7.4 per cent first quarter price rise. The real reason for the small price rise in the first quarter of 1988-89 may well be the greater erosion of the purchasing power of the people caught in 1987-88 famine, compared to the famines in the previous years that were referred to along side of the fact that the rise of 1.6 per cent of the first quarter was on top of the 10.6 per cent price rise of the previous year - when even so 355 items showed price rises in the 1988-89 first quarter compared to the previous year's 255 with 68 items among them showing a rise about 20 per cent compared to the previous year's 54 items[16]. This means that the government has to pump purchasing power into the hands of the poor majority through intensified poverty alleviation and employment generation programmes during periods of drought and famine.

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Urban Land Management

by

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1. Urban development is closely liked to land planning and management. For a long time this was principally carried out through the Town and Country Planning laws. After independence with the large amount of development works including housing particularly of the lower income groups undertaken in urban areas the need for orderly urban development and prevention of growth of slums, has brought to the fore the inadequacies in the current urban land management measures. There is therefore immediate need to examine all the tools available in this regard and evolve specific approaches within the framework of national urban land policies.

2. The principal objectives of land management can be said to be to ensure.

a. Equity — that land resources are not concentrated in a small number of affluent people or groups.

b. Generate additional financial resources—generally for national, state or local governments or specifically for projects.

c. Proper urban development — directing the orderly growth of urban areas and providing land for community needs and housing especially for the lower income groups.

3. This paper, concerns itself basically with the issues in regard to land management for urban development and deals with the other two objectives only in so far as they are relevant to this process. For this purpose the aims of land management have been identified as follows :

a. To obtain a desirable and efficient spatial pattern with linkages to homework-and other activities such as schooling, recreation, shopping.

b. To optimise/maximise utilization of land and prevention of urban sprawl for speculative purposes andcurbing excessive rise in land prices.

c. To obtain land for public needs especially to provide affordable housing for low income groups. This includes supply of land at reasonable costs.

d. To create conditions for increasing the private housing supply at affordable costs for all income groups.

4. A number of tools are available for this purpose which have been used with varying degrees of success in different parts of the country and abroad. The performance of such tools is examined in some detail in the following paragraphs for devising methods appropriate generally to the Indian situation and particularly to the urban areas of Tamilnadu and Madras.

5. The tools examined are :

a. Land use planning including development control under master plans.

b. Land readjustment, land sharing

c. Land acquisition for specific projects.

d. Land Banking.

e. Urban land ceiling.

f. Fiscal measures such as betterment and vacant land taxation.

Landuse Planning

6. Most of the master plans for urban areas have as their operational part zoning, land subdivision control, and planning rules which include FAR, height and set back stipulations. Obtaining a planning permit before any property is developed is obligatory in almost all metropolitan cities and large urban centres.

Zoning

The main purposes of zoning are :

a. To prevent incompatible uses intruding into residential areas. This is sought to be achieved through demarcation and reservation of areas for residential, industrial, commercial, institutional and other uses and through what may be termed as land use regulations. Prevention of premature conversion of land for urban use is also a principle objective.

b. To promote planned development of residential and industrial activitiy through land subdivision regulations, F. A. R., open space requirements and set backs.

7. In the context of Madras, zoning has not been able to achieve the objectives set out under para 3. The reasons are not only in the limited legal and enforcement measures available but also in the socio, economic and cultural framework of urban living.

8. Exclusive zoning of districts is really a transplantation of British and American planning practices promoted by town planners and supported by the administrators and elitists all trained in the ways of the west. This is in variance to the traditional mixed nature of development where residences, shops, household manufacturing and artisanal production exist side by side.

9. Secondly, the approach of developers is to select a site be it for industries, housing or other uses because it is already owned by him or is easy to acquire, provides him with high level of profits, and low tax rates and has the least constraints rather than to first examine whether it would fit into the zoning regulations. So much so, applications for zoning modifications are common. More often than not these are approved when developments are large and seem to be beneficial.

10. Thirdly, the enforcement machinery is weak and unless a development can be shown to be extremely injurious, hazardous or undesirable, the zoning provisions tend to be not enforced. Even the courts take lenient view of such zoning transgressions.

11. The provision to prevent premature urbanization in the peripheral areas, through master plans has also not been successful. In the case of vacant/undeveloped land zoned for a particular use, in the absence of phasing, the permission for development is not generally refusable. In the case of land that has been zoned as agriculture, if any proposal for development is made, as for instance a large subdivision for housing, more often than not, the reclassification for such use is agreed to on the ground that there is serious housing shortage. In many instances subdivision is not for immediate satisfaction of housing but for speculative purposes.

12. Even when, permission for such a development is refused, it does not prevent illegal subdivision, since marketability is not a problem, and permission under zoning is not a precondition for land registration.

13. Often-times when applications for variation of use of a particular property is made, the use of the whole area is changed for the reason that "Spot Zoning" is undesirable. Thus most variations of land tend to become ad hoc.

Sub Division Regulation

14. The regulations, are meant to ensure reasonable environmental conditions. However most regulations stop with stipulating the plot sizes, density and width of access. Water and sewage services do not come into the picture very much since there is no agency for systematic extension of such services particularly in the outlying areas of the city. The probability that these will be provided on site by individuals through sinking of wells or provision of a septic tank is accepted as sufficient for the approval of the sub division.

15. The large plot sizes stipulated in sub division regulations coupled with the fact that road reservation and open space requirements take away about 50 per cent of the buildable land and high costs of raw land make them unaffordable to a majority of the house seekers. Hence, squatting or slum formation becomes the only alternative for the poor including the new migrants.

Planning Rules

16. Planning rules are meant to control, density through FAR stipulations and environmental quality with height and set back regulations. In Madras the FAR is broadly based on locational parameters, thus a higher FAR is permitted in the central area and a lower FAR only is permitted in the peripheral

areas. This acts contrary to the stated objective of the master plan of decongesting central areas and encouraging development in peripheral areas.

17. The planning rules also provide for exemption of these rules in individual cases. This has often been abused and the entire system is brought into disrepute.

18. The landuse regulation system like other regulations is also suceptible to large scale corruption.

Land Readjustment

19. This process chiefly consists of preparing a plan with roads, open spaces and other public reservations in an area declared as a planning area retaining the lands under roads and other public reservations without any payment of compensation. Some additional land is also retained to meet the cost of provision of infrastructure. The remaining land is redistributed to the original owners in proportion to their original holding. The process is explained in some detail in Annexure I. Japan and South Korea have used this process extensively for suburban expansion. Maharashtra and Gujarat states have also used this process under the Town Planning laws. However these have been for middle and high income group housing and low income households are not benefitted. Moreover the holding of large number of plots by individuals has led to speculative tendencies. The provision for land readjustment although was available under the old Tamilnadu Town Planning Act of 1920 and is available under the 1971 Tamilnadu Town Planning Act, it has not been used either in Madras or any other urban area in Tamilnadu.

20. Land sharing is a modification of land readjustment suggested for redevelopment of slum areas on privately owned lands. The use of this method has been included as part of the Tamilnadu Urban Development Project and is yet to be implemented.

Public Land Acquisition

21. Land acquisition for specific projects as also for land banking have been used for planned supply of land. The lands are compulsorily acquired under the Land Acquisition Act 1894 as amended or under specific provisions of other state acts. This tool has been used extensively in Madras since 1950's to develop housing areas. Anna Nagar, K.K. Nagar, Besant Nagar are exampled of such development. However land acquisition under the Act has progressively become difficult, time consuming and costly.

22. Land acquisition for a particular project automatically increases the value of adjoining lands. Land valuation practices-which do not differentiate very much between value of developed land and that of undeveloped land compound the situation. The Tamilnadu Housing Board has not been able to acquire any significant extent of land within MMA in the last few years.

Land Banking

23. Although land banking has been considered as a very good tool for land management with in the country, only Delhi and to some extent New Bombay have been able to do land banking.

Such large scale land banking has not been attempted in Madras. The reasons perhaps are :

a. Heavy initial investment for acquisition

b. Recurring cost of protection of land

c. Limited capacity of public agency to develop and deliver serviced land in relation to demand.

d. Extinction of agricultural uses in the acquired land which can become a sensitive political issue.

Urban Land Ceiling Act

24. The Urban Land Ceiling Act was enacted chiefly to eliminate concentration of urban lands by acquiring "Surplus Land" and distribute it to the havenots. One of objectives was also to make available the Surlpus land for housing.

25. The Tamilnadu Government passed the Urban Land Ceiling Act. on the lines of the Central Act in 1976 which was modified in 1978. Under this Act which is applicable apart from Madras to five other agglomerations, hardly 550 hectares have been declared as surplus of which only 340 hectares have been taken over. Out of this about 120 hectares have been distributed for various uses including for housing. About 24% of this is in Madras agglomeration. This clearly establishes the fact thar ULCR has hardly been able to yield any land for housing to the weaker sections.

26. The Act has however adversely affected land management for housing in Madras in a number of ways :

a. When any acquisition proposal is made by a public agency, it is first necessary to establish that it cannot be taken over under the ULCR Act. This entails delay in acquisition.

b. Before the ceiling, law private developers used to assemble land from individual holders of agricultural land, plot them out and sell for housing. The ceiling law has put an end to this activity legally, since once the agricultural land is proposed for urban use ULCR Act is attracted. In Madras this has however not prevented illegal subdivision. The modus operandi is that lands are subdivided as agricultural lands but sold as small houses sites. The small plots do not attract ULCR. However since such subdivision is not accepted by MMDA, this becomes an "unauthorised" development and building permit cannot be issued. Either the owner has to build illegally or hold it for future sale.

c. The fact that ULCR prevents legal conversion of agricultural land to urban land within urban agglomeration has encouraged land subdivision outside the ULCR limits. In Madras large scale subdivision has been taking place in Medavakkam, Athipattu and other areas within MMA are outside the urban land ceiling act. This has given rise to premature conversion of agricultural lands to urban uses.

27. It will be seen that the ULCR Act has failed to help proper land management in urban areas areas. This

has been recognised by Government officials (unofficially) developers and land owners but Govenment is hesitant to give up this "social piece of legislation" and are proposing amendments which are likely to make the act more regressive rather than useful.

Guided Development

28. In Madras under the Tamilnadu urban development project, a World Bank financed project, it has been proposed to use exemption clause to promote housing for EWS through what has come to be known as 'Guided Development'. Basically the approach is that Government will exempt any development modelled on the World Bank financed public sites and services projects from the provision of ULCR Act. The concept of the scheme may be seen in Annexure II. Till date there has been only limited response and hardly any scheme has taken concrete shape.

Fiscal Measures

29. The Tamilnadu Town Planning Act of 1920 had provision for levy of betterment tax on properties covered by Town Planning Schemes as also on adjoining properties which benefitted from the scheme. The collection of betterment charges bristled with so many difficulties that this was replaced by what is called development charge under the 1971 Act. These developmental charges are nominal and nowhere relate to the increase in value of urban land.

Suggestions have been made to levy a vacant land tax on all urban vacant land with the hope that it will compel the owners to utilise the land and at the same time provide financial resources for urban development.

Conclusion

30. The conclusions emerging from the foregoing discussion are summarised below :

a. Landuse and development control under master plans have not been able to deliver lands for development, for the low income groups. On the other hand, they have, prevented, sub division of land which would be affordable to the low income groups.

b. Acquisition development of land have been successful in the past, but further land acquisition adjoining developed areas has become extremely difficult / costly. Land acquisition itself has become a time consuming, and complex Process and is not able to deliver the required extents of land for housing or other public development.

c The ULCAR Act, which was supposed to release large extents of land for housing of weaker sections, at low costs, has not only been unable to meet this but also prevented developable land, from coming into urban use legally.

d. Taxation as a tool is yet to be tried and some experts hold that levy of such tax may be counter productive.

e. Land readjustment and pooling have not been succesful in delivering land for housing for the low income groups,

Suggested Approach

31. A city like Madras alone, requires to provide about 40000 dwelling units per annum to cater to its population growth. More than half of this requirement is within the corporation limits of 172 sq kms. and the other half is in the periphery where there are agricultural and other undeveloped lands. A conservative estimate puts the land requirement at about 600 Ha/annum. The total land requirements for all the urban areas would indeed be very large. No doubt only conscious attention and allocation of resources by government can enable the provision of land on this scale in the right places. It has been seen that the tools considered above will not be able to meet the objectives of land management used independently of each other.

32. Master plans, zoning and other regulatory measures are too negative and in their current approach are counter productive. Reforms in the right direction can make them respond to the problems of land management for the housing of the poor, but will still be weak and inadequate.

33. The ULCAR Act, which tried to mobilise "existing" surplus land has failed to produce such lands for development and has acted as a brake to development. Any tinkering with the Act will make the position only worse.

It is therefore suggested that the ULCAR Act should be replaced by a full blooded Urban Land Management Act providing for :

i. Acquisition of land for urban development quickly at prices which are fair to the owners and government.

ii. Providing for land pooling by owners combining it with the Guided Development approach.

iii. Introducing fiscal measures such as vacant land taxation, development charges, more as land management measures.

iv. Introducing common valuation procedures for urban and urbanisable lands and establishment of an appropriate land register for monitoring land use and valuation.

v. Bringing in positive aspects of other tools of land management.

34. Complementary action is also needed to reform planning, zoning and building codes to subserve the objective of providing affordable housing to the majority of households within an environmentally acceptable urban environmentally acceptable urban enviroment.

35. Through such instruments only it may be possible to provide oppurtunities for urban areas to manage land resources to meet the objectives enunciated earlier. Each city can then use the various provisions independently or in conjunction with others.

ANNEX I

Land Readjustment

1. Land readjustment projects have been widely used for comprehensive development of urban areas both in Japan and Korea.

2. Land readjustment, which involves the exchanging and sharing of land, had its start in the improvement of farmland (i. e. arable land readjustment) through the cooperation of landowners.

3. A land readjustment project is intended to create a favourable urban area fully equipped with urban infrastructure through the development and improvement of public facilities, the exchanging and sharing of land and charges in the shape of regular buildable land parcels within a specified area.

4. To be more specific, a project involves having each landowner or leaseholder present a part of his land on equitable terms and creating reserved land for use as sites for public facilities or as the source of funds for defraying development costs. Even though individual sites become smaller, they increase in value because they are more ordered and have been provided with public facilities. In this way land readjustment projects produce and develop land necessary for public facilities without cost to the public, and they develop urban areas while apportioning benefits and costs equitably among landowners and leaseholders.

5. Land readjustment is characterised by the following features :

* Where a project area is extensive, it is possible to devolap urban infrastructure comprehensively, from city-level facilities to district-level facilities.

* The people in a project area can continue to live there after the project's completion.

* Those with rights over land in a project area share development benefits and costs equitably.

* It provides with regular lots for building.

6. The flow chart shows the stages in the project process and the maps indicate in a typical case (Fujimori-Tohbu, Nagoya-Japan) the original state of land ownership, the replotting of the properties showing roads, the public reservations, and finally the status of the area after a large section of the area has been constructed upon. The process from forming an owners association upto provision of infrastructure and land exchange has taken in this instance about 8 years.

7. Land pooling can be successful in cases where :

* There is strong legal back up.

* There is cooperation among the participants.

* The difference in the value of developed land and that of undeveloped land is very large.

* There are not many small properties or properties with buildings within the project area.

* There is a well established and accepted public land valuation system.

* There is no tendency for hoarding of land on the part of the owners.

* There is adequate management capability by the public body to tackle the many problems that arise during the process.

ANNEX II

Guided Urban Development (GUD)

1. The objectives of Guided Development is to involve the private sector in the provision of low income dwelling units. At present, most of the private developers generate plots or sites for housing which are affordable only by

the middle and higher income groups. In order to modify this approach of the private developers, it will be necessary to work out a package of incentives to pursuade the private developer to participate in a programme which will provide for a large proportion of dwelling units for allotment to low and medium income households.

2. Essentially the emphasis is on ensuring :

* Fair return on investment to the private owner/developer, and at the same time.
* a relatively large proportion of serviced sites for allotment to low-income families.

3. Prospects for such development have been incorporated in the Tamilnadu Urban Development Project for operation by MMDA within its jurisdiction.

4. Since as constraints on free sale is implicit, the scheme can best work when lands are notified for acquisition or are subject to the Urban Land (Ceiling and Regulation) Act, 1976. The steps involved may be summarised as follows :

* The MMDA prepares guidelines for developers to meet the objectives mentioned above. The most critical amongst the guidelines is specifying the minimum number of low-income plots that must be developed per gross hectare of land. The project itself would be modelled as public sites and services approach.
* The MMDA would then invite development proposals that conform to the guidelines. As the economics of the scheme depend on land prices, proposals are expected to come from locations most suitable for early development.
* The MMDA would approve the draft development proposal and agree to recommend to Government for exempting the land from the Urban Land (Ceiling and Regulation) Act.
* The MMDA will have pre-emptive rights to purchase low income plots and social facility areas at predetermined prices.

5. The detailed steps involved in the implementation of guided development are as follows :

(a) GTN / MMDA announces that it is seeking applications to implement GUD schemes (which may be restricted to a particular area or areas in the MMA);

(b) A land owner, or a developer on behalf of a group of land owners, prepares and submits GUD proposals as per Guidelines prescribed by GTN ;

(c) MMDA evaluates the GUD proposal.

(d) MMDA negotiates with developer any changes in the proposal that are necessary, including the manner in which price of EWS plots and advances are to the paid to the developer by the MMDA.

(e) MMDA enters into a formal agreement with the developer ;

(f) MMDA recommends exemption under Sec. 21 of ULC Act to GTN ;

(g) GTN exempts land under Sec. 21 of U L C Act ;

(h) MMDA pays an advance on purchase of EWS plots ;

(i) Developer commences development work (on site infrastructure and on plot development) ;

(j) TNHB / other service agencies commences off-site work, if any;

(k) Developer hands over EWS plots and plots for community facilities and roads and other infrastructure to MMDA / GTN ;

(l) Developer sells and transfers title of higher income and other commercial and service industry plots (only after step (k) ; and

(m) MMDA allots EWS plots to the selected beneficiaries, takes standard down-payments and makes long-term loans to beneficiaries.

Greening the Coastal Sea Ecosystem : Collective Action and Renewable Resource Rejuvenation

by

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Introduction

Issues concerning the degradation of our planet's environment and the implications this has for the future of life on earth are matters of widespread concern today. Together with this environmental consciousness there is a growing recognition that the most affected environmental resources are those over which control by individuals, firms or the state is difficult to establish and maintain. Such resources are often qualified using the adjectives "open access", "common property' or "common pool" implying that in general they are open to use by all and owned by none.[1] Important examples of such resources include: the earth's atmosphere, seas and oceans ground water, forests and village grazing grounds.

Contemporaneous with this welcome environmental consciousness is the resurgence of influential opinions that in the case of resources that are in the realm of the "commons", precious little can be done to save them from ecological ruin.

The most influential of these opinions is that of Garett Hardin whose expression "tragedy of the commons" (Hardin, 1968) is today gaining currency in symbolising the degradation of the environment that is to be expected *whenever* many individuals freely use a resource in common.

There is a less known formulation of Hardin's opinion which contrasts the difficulty of getting individuals to pursue their joint welfare, as opposed to their individual welfare. This was developed

* Common property as an institution must be distinguished from free and open access resources. In the case of common property there exist non-market institutions to manage it. Common property resources are accessible to a wider community though no individual has exclusive property rights. It is therefore the absence of management rules that distinguish free and open access resources. (See Runge 1986; Jodha, 1986 and Ciriacy Wantrup & Bishop, 1975).

by Mancur Olson in his well known book 'The Logic of Collective Action' (Olson, 1965). Olson was of the opinion that the mere presence of a perceived benefit for a group was *not* sufficient to create collective action possibilities to achieve that benefit. He agreed emphatically that"...unless the number of individuals is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, *national, self-interested, individuals will not act to achiave their common or, gruop interests*" (ibid p. 2 emphasis in the original).

These opinions have been formalised as a Prisoners' Dilemma Game (Luce and Raiffa, 1957) which has long held sway among scholars who have studied questions of cooperation and non-cooperation. The game illustrates the paradox that rational strategies of individuals can lead to collectively irrational outcomes. This seems to challenge a fundamental tenet that rational human beings can achieve rational results.

The net result of this growing environmental awareness and concomitant sway of "tragedy and dilemma" models tend to make policy makers and concerned observers pessimistic about the possibilities of collective action to protect, manage or nurture common renewable environmental resources. The spectre of helpless individuals inextricably caught in the process of destroying their own resources is constantly evoked in the public mind.

The consequences of such a line of analysis are best reflected in the policy prescriptions that emanate from influential quarters at national and international levels as regards the *modus operandi* in creating institutions and institutional change for regulating common environmental resource usage. These prescriptions either emphasise the 'market solution' where "sovereignty of the idividual, the sanctity of private property and the domination of the present" (Perrings, 1987) are highlighted or propose the 'state solution' where a centralised controlling authority be granted the powers — coercive if necessary — to allocate and protect common resources.

Two strong assumptions are implicit in these 'market and state' prescriptions.

Firstly, they imply that institutional change *must* come from outside. This they take as inevitable for the simple reason that individuals affected by a deteriorating common property resource situation would refrain from investing their own resources and time for collective action to solve dilemma.

Secondly, they emphasise only the issue of safeguarding or modulating the "flow" aspect of common resources — its regulation and management—with little under standing or appreciation of its "stock" aspect — particularly the dimension of nurturing and the long term sustainability of the total resource system.

There are numerous examples from different parts of the world both from developed and developing regions which call to question the first assumption : The successful anti-soil erosion and reforestation measures by the farmers of Sukhomajri in the lower Shivalik range of the Himalayas (Chopra et al, 1990), the peasants of Torbel, Switzerland, who have for over seven centuries managed their communally owned grazing lands (Netting, 1981) ; the communally managed irrigation systems of Ilocos Norte, Philippines (Siy, 1982) ; the innovative self-regulation of the coastal waters by the fishermen of Alanya in Turkey (Berkes, 1986) and those in Lofoten, Norway (Jentoff, 1989).

As regards the second, one only needs to examine conventional conservation strategies to observe that much of the stress is merely on reducing the consumption of renewable resources without necessarily reflecting, for example, on the effect that the harvesting / extraction technologies used have on the ecosystem in which the resource is found.

In this paper we shall examine once again if these influential opinions are always valid. To achieve this we shall examine a marine fishery situation in the lower south-west coast of India where fishermen confronted with a declining harvest from their coastal waters have undertaken macro measures to regulate and safeguard, as well as micro measures to restore and rejuvenate, their common property resource.

Their collective action at the macro level has been dealt with elsewhere. (For details see Kurien 1989 and Kurien and Achari 1989). Our focus will be on the latter, the micro-level measures, particular reference to the village level attempts to erect artificial reefs in the bottom of the sea for greening it.

The micro-level initiatives also have two facets to it :

(a) The adoption of mechanical propulsion, more efficient fishing gear and craft. These were primarily individual responses to the market forces that prompted these changes and also to state apparatus which also gave a boost to these initiatives.

(b) The conscious, collective attempts on their part to undertake construction of artificial reefs as a means of rejuvenating the primary production in the coastal water ecosystem which had been severely damaged by destructive fishing techniques.

In this paper we will focus on these measures to erect artificial reefs in their attempts at greening the coastal sea ecosystam.

Origins and Decline of Artificial Reef Construction

The idea that certain types of external objects in the sea tend to hasten the primary production of microscopic plants which in turn attract fish to them has undergone considerable evolution among the fishermen of the region. Since these fishing communities have only an oral tradition, we can reconstruct history only from the reminiscences of old fishermen.

There was an age old practice, among the artisanal fishermen of the region who operated the shore-seine, of dumping rocks fastened with coconut fronds into the near shore sea within depths of 5 to 10 metres. After a few months fish tended to aggregate over and around these rocks and were more easily netted by the shore-seines.

The discovery of shipwrecks in the region and the amazingly higher concentration of fish over them further confirmed their ideas about the role which artificial structures in the sea played in providing to fish the greenery (food), the sanctuary (from predators) and the facility to breed.

Between 1949 and 1957 there were several attempts by groups of fishermen to create such artifical structures using a variety of their villages.

For almost a quarter of a century after that there is no record of such efforts by fishermen though several accidently formed reefs continued to

provide occasional fishing spots[2]. These generally remained lucrative fishing grounds for a time and then ceases to be productive after a while.

The sudden loss of interest in reefs can be largely attributed to the new fishery development strategies of the 1960's which resulted in an initial spurt in fish harvests. The introduction of nylon nets can certainly be cited as one important factor in achieving these increased yields from the sea.

The importance given to the fishery sector changed rather dramatically. The country was facing an acute foreign exchange crisis and every effort had to be made to increase exports. In the early 1960's there was a dramatic increase in prawn prices in the international markets. To cash in on the prawn boom, new harvesting technologies like bottom trawling were promoted in a big way by the government. The marine fish harvesting sector — once the exclusive preserve of traditional fishing communities who viewed the sea as their community asset — became a virtual open access resource to anyone who could afford to make the necessary investments in craft and gear. Fishing effort increased substantially in the 1960's.

In Kerala State, from a level of 75 percent of the maximum sustainable yield (MSY) in 1961 the fish harvests in 1971 crossed the MSY level. Since prawns were mainly found in the near-shore coastal waters there was virtually no increase in the fishing area following the introduction of the new technologies. A greater and more powerful fishing fleet was continuously harvesting the same stock of fish in a small area of the coastal sea. However, from 1975 onwards despite rising investments (or rather because of it) the harvests begin to fall below the MSY indicating that the resource *system* as a whole was at the verge of an ecological crisis. The substantial drop in yields per fishermen (both in physical and value terms) resulted in lower income levels despite rising fish prices. A socio-economic crisis was also in the making. (See Table 1)

The year 1979 witnessed the beginning of a socio-ecological movement among the artisanal fishermen of the region. They made three major demands to the state authorities : (a) a ban of trawl fishing during the monsoon months of June, July and August which was the breeding season for many specie of fish (b) the creation of an exclusive fishing zone for artisanal fishermen in which fishing using techniques which destroy the coastal ecosystem were to be totally prohibited all year (c) a greater share in the fishery development budget of the state.
(See Kurien and Achari, 1989)

By the mid-1980's this movement had attained the dimensions of a major political force in the region. In a parliamentary democracy with numerous coastal constituencies, a restive fishing community is no solace for politicians irrespective of their political colour. Leaders of every political party began to take the fishermen's demands seriously

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[2] The most interesting examples are that of the spent rocket heads (fired from the equitorial rocket launching station, Trivandrum) that dropped into the sea. Initially the authorities provided a compensation to fishermen who "discovered" these heads - when their nets got entangled on them and partially destroyed in the process. Soon the fishermen observed that the rocket heads became good fish aggregating devices.

TABLE : 1

Select Data on Kerala State's Marine Fishery Sector

	1961	1965	1971	1975	1981
Fish Harvest (000 tonnes)	286	339	445	420	274
Harvest as % of MSY (MSY = 380,000 t)	75	89	117	110	72
Price of Fish (Rs/tn)	120	200	660	1760	2000
Value of Harvest(Rs.mn)					
Current Prices	35	68	293	740	548
Constant Prices (60-61)	35	48	138	197	144
Active Fishermen(000)	80.7	88.6	101.9	111.6	127.9
Fishing Crafts					
Non-Mechanised	20667	20900	21718	25100	26271
Mechanised	152	501	1780	2105	3038
Productivity per annum					
Physical (Kg/worker)	3540	3320	4370	2105	2140
Value(Rs/wkr-current)	430	770	2900	6600	4300
(Rs/wkr-const	430	550	1370	1760	1134

irrespective of whether they were in or out of power.

The second and third demands of the fishermen were conceded by the government by 1984. Legislations to zone and regulate the coastal commons and the a police force to enforce it was set up. The emphasis on promoting prawn exports using state finances was relegated and funds were earmarked for investments which would directly benefit the artisanal fishermen. A big push was given to upgrade their harvesting technology by supplying outboard engines, beach landing crafts and new fishing gear. Welfare measures for artisanal fishermen and their families were also increased significantly. The demand for a total monsoon trawl ban was conceded only in 1989 after three scientific commissions had studied the matter following the fishermen's refusal to compromise on this issue.

The socio-ecological movement was their first collective macro-initiative to re-establish their historical rights of exclusive access to the in-shore coastal commons. This was largely a political process emanating from their long term

concern for themselves and for fish.[3] Its very organisational form — an independent trade union—and organisational processes — grassroot level mobilisation using a wide variety of militant but non-violent forms of protest — gave the initiative a special synergic effect which alone helped to sustain their struggles for over a decade.

Resurgence of Artificial Reefs

It is against this background of a depleted coastal commons and the fishermen's ability to extract from the state a commitment to providing the legal enforcement apparatus for zoning and regulating the use of the commons that we must situate the renewed initiatives among fishermen to erect artifical reefs.

These new reefs were developed primarily as a result of the initiative of the hook fishermen who were convinced that they had to help *Kadalamma* (Mother Sea) to rejuvenate herself after the onslaught of trawlers. Though they were victims of a tragedy of the coastal commons, they did not become strait-jacketed prisoners in this dilemma. Several groups of these fishermen from as many as 22 villages decided to take creative, collective action to erect reefs in the coastal waters off their villages fully aware that the benefits would accrue to the group/community as a whole. These actions also need to be viewed as the micro-level expressions of their larger socio-ecological movement.

Reefs erected in this manner we have termed people's artificial reef or PAR's.

In the first decade of the fishermen movement (1979-89) the pace at which PAR's were erected increased substantially. These efforts were however restricted primarily to the 130 km coastline of the Trivandrum and Kanyakumari Districts.[4] (See Table 2)

TABLE 2

People's Artificial Reefs Erected in Trivandrum and Kanyakumari

Period	Before 1960	1979 - 1983	1984 - 1989
No. of PAR's Erected	2	9	21

Source : Adapted from Kadappuram, 1989

[3] This is best illustrated in the words of the artisanal fishermen who was on his si xth day of an indefinite fast before the government secretariate demanding greater regulation of the coastal waters. "Our struggle is to ensure a future - for us and fish' (See Kurien 1989).

[4] There are 80 villages on this stretch of coastline. In 1980 the number of active fishermen numbered around 50,000 and the total fishing community was 226.400 strong.

The stretch of coastline where PAR's have been erected can be further divided into three zones with the city of Trivandrum as the reference point: Zone 1: The villages of the south of Trivandrum which have a predominance of hook fishermen who use the *kattumaram* as the main craft. This region had a greater number of natural reefs. It is perhaps one of the most densely populated set of fishing villages in the whole country. Zone 2: The villages around Trivandrum where hook fishermen (using *kattumarams*) are in the minority and shore-seining is an important gear. The plank canoe is the predominant craft which is used for other forms of coastal fishing. Zone 3: The villages north of Trivandrum city where the presence of hook fishermen (using *kattumarams*) vary from village to village. In general they are not the "original settlers" having migrated to this Zone from the southern villages (recall the village of Anjengo). A significant number of the original settlers among the fishermen in this zone depend on shore-seine fishing, which coincides with the best hook fishing season—November to march. (See Table 3)

TABLE 3

Percentage Distribution of PAR's Along the Coast

Area		Pre - 1960	Post - 1979
Zone 1	Villages south of Trivandrum City	100	40
Zone 2	Villages Around Trivandrum City	—	50
Zone 3	Villages north of Trivandram City	—	10

Source: Adapted from Kadappuram, 1989

Incremental Changes in Par Design

The "first generation" reefs erected before 1960 used the materials available at the village which the fishermen could obtain free (no money cost for them). This 'whatever-you-can-get' approach to collecting materials to erect reefs continued.

However with the more organised and widespread efforts to build PAR's it was unlikely that such an approach could continue for long. We notice that in the "second generation" PAR's erected between 1984-86, while granite stones wrapped in coconut fronds remained the main component, three more important additional items were widely used. Large rocks packed in monofilament net bags; the screw-pine plant and cement well rings. All these items had to be specially ordered or collected for the purpose and paid for also.

After 1986 there was a further spurt of changes. The use of old automobile tyres tied to the cement rings was tried out by the fishermen in Valiyathura.

In Thoothoor, the granite stones were painted red before they were transported to the sea.

Along with this came the measures taken to protect the PAR's from getting covered by fishing nets. Rings with built-in hooks, anchors and concrete pillars placed at the four corners of the PAR structure were examples of the measures taken by the fishermen.

The incremental changes in the materials and in the designs used for the erection of PAR's are primarily the result of two factors : (a) the artisanal fishermen's understanding of the ecosystem and (b) the process of sharing this knowledge among themselves.

Understanding of the Ecosystem

The basis of PAR's as an important initiative for coastal ecosystem rejuvenation stems from the understanding of the fishermen that PAR's cater to the basic needs of fish : their need to feed ; their strong desire for protection, rest and shade ; and their urge to breed.

For a PAR to be a source of food the kind of materials used to build the PAR gain important. Materials on which benthic vegetation will quickly aggregate is crucial to ensure adequate food supplies. The PAR needs to be erected in areas where the sea bottom is naturally productive. To serve needs of overall protection, the structure and the position of the PAR are determining factors. Only a PAR of sufficient height will provide shade. Structures which are solid are not condusive for rest and shade and do not provide hiding places from predators. If fish are to make PAR's their breeding grounds, then the requisites of food and protection become imperative.

If fishermen are to catch the fish which make use of the PAR's in such a wide variety of ways, then the PAR's should be aligned on the seabed in the East-West direction. Given the North - South direction of the currents in the region this is the best alignment to ensure that the maximum number of fishermen can fish over a PAR at the same time without getting their hooks entangled.

They have learnt that ideally PAR's should be located in the "fish channel" — a path which fishermen of the region have identified between 25 and 50 metres depth.

Refering to the way this total understanding of fish behaviour helped to induce fish into the PAR's one fishermen remarked : "The fish teaches us and then we teach the fish".

Sharing Knowledge

The process of sharing the knowledge which they had accumulated over the years was achieved by the unique possibilities for inter-village discussions on these matters.

The forum to achieve this was provided by the Programme for Community Organisation (PCO) a non-governmental organisation — initiated by this author and a few other social activists — which had been in close contact with these fishing communities for over two decades. The exchange of information regarding the materials and design for PAR's was achieved as part of the systematic attempts by the PCO to encourage fishermen to articulate more clearly the slowly disappearing oral traditions of their knowledge systems so that it could be documented and where possible refined and complemented with the knowledge

of modern science. The process revealed the possibilities of undertaking what Norgaard referred to as a "coevolutionary development process" of the two knowledge systems. (See Norgaard, 1984, Kurien, 1987)

The need for a better understanding of the nature processes that takes place underwater around a PAR has highlighted the scope for a far greater degree of collaboration between coastal fishermen, marine biologists, oceanographers and other scientific personnel.

These discussions gave a big impetus to the learning process and provided occasions for collective thinking on micro-level options. It widened their horizons and gave them the possibilities of knowing what went on around them and also in other parts of the world vis-a-vis artifical reefs.

Evolution of Institutional Forms in Par Design

Along with the discussions about materials and designs also came the concerns about the micro-level institutional processes and forms adopted in erecting and maintaining reefs.

The details which we have of the pre-1960 reefs indicate that though the erection was the result of a small group initiative, the use of the reef was open to whole community. There were no perceived "private costs" to the group since the materials used were obtained free of cost by the fishermen and the labour involved in erecting the reef was considered as *shramadan* (voluntary labour). As a result the initiators did not think in terms of private returns or property rights.

In the post-1980 PAR's, materials had to be specially ordered and transported to the village before they could be taken out to sea. Since hooks and line are the most effective fishing gear to fish over the PAR's, the initiative to erect them came from the fishermen who were accustomed to hook fishing.[5] The distribution of post-1980 PAR's indicates that the first initiatives came mainly from the villages around and to the south of Trivandrum. (Zone 1 & 2) (See Table 3)

What we observe in this period is an evolution of institutional initiatives in erecting and fishing over reefs. It may be useful to consider the activity of erecting reefs as the initiative to rejuvenate the *stocks* of the coastal commons and the activity of fishing over the reef as the use of the *flows* from the coastal commons.

We can distinctly identify initiatives for erecting reefs from four sources: individuals, groups, whole communities and external agencies. It is not that these four types are mutually exclusive. For example, certain leading individuals may play a crucial role in the initiatives of a group. Alternatively, an external agency—eg. an NGO, the church/temple, — may financially or otherwise assist a community or a group in erecting a reef.

It is also pertinent to note that there are certain combinations between those who take the initiative to erect reefs and those who finally fish over them which are incompatible. For example,

[5] Other gears may also be used. However a lot depends on the structure of the reef. In the Bay of Bengal off the coast of Tamilnadu, fishermen use lift nets over reefs.

it is unlikely that an individual would take the initiative to erect a reef and the same or another individual alone fish over it. Similarly, it is highly improbable that a whole community would invest in a reef and reserve the right to fish over it to an individual.

We shall enumerate below five "initiative / use" combinations which have been observed in the post-1980 period (A to E) and one which is likely to emerge soon (F). At the present juncture, some combinations co-exist. Some of them are likely to emerge as dominant forms.

A. Individual Initiative / Group Use

One of the first post-1980 reefs was erected by the initiative of an ex-serviceman from the fishing community who resided in the village of Valiyathura. (Zone 2) This was in 1983. He organised the erection of the reef partly using material freely available on the beach (stumps of coconuts etc.) and arranged for the purchase of granite, cement rings etc. This reef came to be known after him as "Ouseph Paar." The total cash investment was estimated to be about Rs. 1000/- which Ouseph claims to have made by pledging his wife's gold ornaments. He hoped to recover this investment by collecting a rent from the fishermen who used the reef. The reef became productive in about three months and became known as a good fishing spot. Due to the difficulty of monitoring and preventing free access to the reef, Ouseph's hopes of profit were only partially realised.

B. Group Initiative / Group Use

"Ouseph Paar" became the inspiration for fishermen to consider taking their own collective initiatives to erect reefs as the means of rejuvenating the coastal commons and enhancing their fish harvests. They joined together, formed a coherent group, collected equal shares and erected a people's artificial reef.

Interestingly these small group initiatives were restricted to the villages around Trivandrum City where hook fishermen are in a minority. (Zone 2) In 1984 the fishermen of Kochuthope, a village just north of Valiyathura erected a PAR which cost them Rs. 6000. Initially only 100 fishermen had access rights to it. Subsequently when the PAR was built-up again the membership was raised to 300. Their collective experience of restricting the use of the PAR to the members was fairly successful.

We notice that there was a spurt of group initiative / group use PAR's erected in these villages during the years 1984-85. These were located just outside the range of the shore-seine operations (about 15 metre depth) which is about 1.5 to 2.0 kms from the shore and just within keen eye-shot.

Fishermen enumerate five distinct advantages to this location : (a) it prevents conflict with shore-seine operators (b) it allows for easier monitoring of the PAR for poachers—mainly from the neighbouring villages (c) it is within rowing distance thus ruling out the need for mechanical propulsion to reach the PAR hence reducing the costs of fishing (d) proximity also makes the PAR accessible to the older and the very young fishermen (e) since the reef fish

are fresh and brought quicker to the shore they fetch a higher price.[6]

C. Group and External Agency Initiative / Group Use

In early 1988 the fishermen of Valiyathura, who were members of a village-level cooperative which was part of the apex organisation called the South Indian Federation of Fishermen Societies (SIFFS), decided to erect a reef. They formed a group of 100 members with each one contributing Rs. 100 towards the cost of the reef materials. They approached SIFFS for a grant of Rs. 10,000. The amount was granted and the SIFFS took the initiative to arrange for fishery scientists to be associated with the erection and monitoring of the biological aspects of this PAR.

Access rights did not in anyway materially affect the activities of the scientists who were monitoring the biological changes that were taking place underwater on the PAR. However if one was to assess the PAR's economic viability — a task which SIFFS intended to do — restricted use rights would make the task much easier. The concept to group initiative and group use was therefore supported by SIFFS.

D. Group Initiative / Community Use

Our enquiries reveal that at about the same time as the fishermen in the villages around Trivandrum City were erecting their "group initiative-group use" PAR's, fishermen in the villages south of Trivandrum (Zone 1) where hook fishing predominated and where natural reefs were once in abundance, were erecting PAR's in what was termed by them as the *utsava shylee* or festival approach.

This form of erecting PAR's is analogous to the funding and celebration of a village festival.

For village festivals the funds are collected from all the households in the village on the basis of "whatever each one can give happily" in cash or kind. The actual initiative and hard work of organising the festival is taken on by a core group (a festival committee)whose primary gain is social recognition. Any number of volunteers are accommodated. While the grandeur of the festival is proportionate to the total funds raised, access to the fun of festival day is open to all irrespective of their contribution.

The analogy can be fully extended to the PAR's erected by these fishermen. These PAR's are assets created with a large group initiative with access open to the whole community.

E. Community Initiative/Community Use

It was during discussions at the PCO that fishermen from the southern villages heard authentically about the "privatisation" of reefs by small groups in the villages around Trivandrum. They were astonished and remarked : "You dont" show your narrowness at a village festi-

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[6] Achari, 1988 in a study of these PAR's has reported that in the village of Vetucaud there was a strong conflict between the minority group of hook fishermen who erected the PAR and the shore-seine fishermen who with the backing of the church authorities were able to ensure that the PAR was d stroyed. Achari also reports that the catch and the net returns per fishermen from these PAR's is marginally higher than what is obtained by hook fishermen of the region as a whole.

val or at sea. Both are for all. "A very *animated discussion followed in which the implications of the philosophy of stewardship of natural resources was raised*. They were of the opinion that as children of the sea and as those who know the secrets of the sea, such a narrow and partisan approach was not warranted *between themselves*.

The southerners suggested that while access to the PAR's should be open to all, certain community agreements need to be evolved to restrict fishing effort by individuals. For example : there should be a limit placed on the number and size of hooks used; the use of lights to fish over the reef at night should be prohibited. This would ensure a more equitable distribution of the catch. Community sanctions for those who violated these norms were appropriate.

These inter—village discussions about the need for more "community initiative/ community use" PAR's has resulted in a self—critical review of the other approaches.

The most recent initiative to create a PAR by the fishermen of the village of Thumba in the north of Trivandrum (Zone 3) bears witness to this. In true festival style the whole community is involved in the fund raising efforts to erect a PAR which they claim will help to rejuvenate a natural reef which was recently destroyed by the indiscriminate fishing of a large fleet of trawlers. They have formed a "sahodara samajam" —brotherhood fraternity—with the whole village actively participating in the venture.

The changes in materials, designs and institutional forms—the hard and software—have resulted in PAR's attaining a wide range of "meanings" to the artisanal fishermen. They are no more just the collective effort of "throwing granite into the sea".

PAR's are symbolic of the creative efforts for "greening the sea." PAR's provide the avenue for the creative use of their accumulated, transgenerational knowledge about the aquatic milieu and the behaviour of fish.

PAR's are seen as the appropriate physical structures for a fencing of their exclusive fishing zone against the incursion of trawlers.

PAR's are the rallying point for collective action in evolving institutional processes and institutional forms for coastal resource rejuvenation.

F. External Agency (State) Initiative/ Community Use

Interestingly, among the policy makers, government bureaucrats and scientists there was not even an awareness about PAR's and their growing numbers until it was brought to their notice by the programme for Community Organisation in 1987.

When they were first appraised of the matter they viewed these initiatives to be quaint. It did not fit into the usual patterns of development and management strategies which they had initiated following the recognition that the coastal commons was facing an overfishing crisis.

Given their preoccupation with ways and means of getting the maximum amount of fish out of the sea with a minimum of social conflict and law and order problems, it is not surprising that they initially considered this "throwing of granite into the sea" to be a waste of time, materials and money. Provid-

ing outboard engines or better craft to artisanal fishermen to fish in deeper waters or putting into action a marine police force to regulate fishing was more in line with their concerns.

However, with the spreading of the idea of PAR's among the fishermen and the scientists, the policy makers have begun to taken cognizance of the matter. Initiatives of the fishermen along the lower east coast of India (Tamilnadu) to build reefs and the role of NGO's specialising on rural technology in assisting their efforts has prompted the Department of Science and Technology of the Government of India to initiate a national programme on artificial reefs. One hearing about the intiatives along the lower south-west coast the perview of the programme has been extended to include this area. It will now only be a short while before the funding of artifical reefs becomes an accepted progamme of the state's fishery budget.

At the present level investment (on average about Rs. 10,000 per PAR) the scale is too small for a state sponsored programme. However, the growing appreciation among the fishermen of the need for bigger and better designed physical structures for PAR's — for e.g : specially designed concrete structures or the use of old bus bodies etc.— is creating a latent demand for a greater level of financial investment in artificial reefs. The larger the level of investment the more "viable" it comes for governments and financial institutions to invest in reefs.

The Future of PAR's

We need to examine if there has been any direction in the evolution of institutional initiatives taken by fishermen in erecting and using PAR's. A matrix illustrating the "initiative/use" combinations which we have enumerated indicates that while there is a convergence towards community *use* of reefs, the initiatives to *erect* them are likely in the future, to come from both the community and external agencies. (See Table 4)

The convergence towards community *use* of PAR's is a resolution of a dilemma and a reaffirmation of a choice (made by fishermen) that the coastal waters are their social asset and should not be privatised by individuals or small groups. The divergence in the initiatives in *erecting* PAR's—between the community and possibly the state — point to "higher order" dilemmas and choices.

Large scale state investment — even if the reef thus created will be open to use for the whole community of active fishermen—will tend to "standardise" artificial reef construction taking out of it the "people's science" element as well as the popular, decentralised, participation in creating this social asset. People loose their autonomy and become passive recipients of the benevolence of a central authority. The values associated with PAR's as concrete expressions of the people's will and resolve to nurture a damaged ecosystem will tend to get lost in the euphoria of reefs as a souree of fish and quick profits.[7]

[7] This is likely to be an imminent possibility given the keen observation by fishermen that cuttle fish (sepia pharonis) which has a big export demand, spawn in the PAR's. Whether fish other than specific "reef fishes" breed on artificial reefs still seems an unsettled issue among Americian and Japanese scientists. The former continue to debate whether artificial reefs actually increase productivity or merely attract and concentrate organisms from surrounding areas. Japanese scientists generally have little doubt that artificial reefs, when properly designed, sited and placed can be used to increase the productivity of desired species. (Sheeby, 1982)

TABLE 4

Matrix of Initiatives to Rejuvenate the Stocks and Use the Flows of the Coastal Commons

Rejuvenate the stocks	Use of the flows: IND	Use of the flows: GRP	Use of the flows: COM
IND	[ ] [*]	"Ouseph Paar" (1983) [A] (Zone 2) [ ]	[ ] [*]
GRP	[ ] [*]	All PAR's Zone 2,3 post-1983 [ ] [B]	[ ] [D] Pre-1965 & post-1984 PAR's in Zone 1
COM	[*] [ ]	[ ] [*]	[ ] [E] "Sahodara Samajam" (Zone 3) (1990)
EXT	[*] [ ]	[ ] [C] "Society Paar" (1988) (Zone 2)	[ ] [F] Possible state funded reefs for use by all

Note: [*] indicates improbable combination
IND = Individual, GRP = Group, COMM = Community
EXT = External Agency

(A,B,C,D,E & F refer to the "initiative/use" types)

People's artificial reefs (PAR's) will become just artificial reefs (AR's) !

Lessons in Collective Action

The evolution of the actions of the fishermen of the region in erecting PAR's questions the prediction that people confronted with a Hardinian tragedy will in accordance to Olsonian predictions not join hands for collective action unless coerced to do so. It also raises the issue about assumption of the prisoner's dilemma game : that there cannot be any change in the structure of the game.

Examining the brief history of PAR's we see that once those caught in a

dilemma meet together, discuss, exchange views and learn from each other it is unlikely that they will retain the status quo structures. They evolve new learning, new institutions and new trust among themselves — attributes which contemporary theories of collective action do not address.

We have observed how the resurgence of reef building, in the wake of the marine resource crisis, has also brought with it the reaffirmation of the community's responsibility to nurture the resource-system which is the basis of their survival. It has also provided a new, collective motivation for them to articulate, sharpen and expand their knowledge base and provide fresh foundations for the growth of community leadership and widespread participation in the process.

As Chopra et al (1990) rightly suggest : "when conventional methods of development fail there is a need for some rethinking about the socio-economic institutions that link resources, people and governments."

However, we have seen how people's initiatives at creating institutions very quickly interface with market and/or state. This can in turn lead back to "conventional methods of development".

The future of these small-scale fishing communities in the lower southwest coast of India and the common property resource which they consider their inheritance does not depend overwhelmingly on the success or failure of PAR's as technological artifacts. It however hinges crucially on the cultural, socio-economic and political empowerment which results from the processes and institutions evolved in the collective action while erecting and maintaining them.

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Methodology for Integrated Watershed Management Through Operational Research Project

by

P. Samraj *

Introduction

For a stable-and growing economy of a nation proper and optimum utilisation of the natural land and water resources is essential, particularly, in the field of agriculture. There is close interaction between land and water for obtaining maximum production of food, fodder, fibre, timber and raw material for agro-based industries. A large number of land and soil characteristics, such as physiography, land slope, nature and depth of soil, present land use, geology, climate etc. and the hydrological behaviour of a specific land area are responsible for obtaining the most productive interaction between these two resources. Watersheds being natural hydrological identities, respond more effectively to the various engineering, biological and cultural treatments designed to maximise production. The watershed approach provides an integrated development of the different parts of the watershed in accordance with their nature, problems and potential. Thus, integrated watershed management demands a multi-disciplinary approach.

Watershed Approach

Watershed management can aim at (a) prevention of denudation and check accelerated erosion ; (b) control of floods; (c) regulation of water supply ; (d) general development of the area ; (e) sustained food, fuel, forage, fibre and fruit production ; and (f) improvement in quality of life. Watershed management is the rational utilisation of land

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and water resources for optimum production with minimum hazard to natural resources. It essentially relates to soil and water conservation in the watershed which means proper land use, protecting land against all forms of deterioration, building and maintaining soil fertility, conserving water for farm use, proper management of local water for drainage, flood protection and sediment reduction and increasing productivity from all land uses.

Soil Conservation programmes which engulf water conservation also, cannot be effectively implemented without following the watershed approach. The application of the watershed concept, however, may differ with different objectives of various development programmes. Progressively, the watershed approach has been refined and the Soil Conservation programmes have been moving towards the total watershed management strategy.

The concept of optimum development of Soil and Water on a watershed basis has been virtually accepted for the relevant programmes. For the implementation of this concept, a large amount of ground work needs to be carried out with regard to preparation of a frame work by selecting suitable sizes of watersheds for different programmes ; developing methodology for watershed planning; creating well trained technical staff for survey, planning and implementation; motivation of population dwelling in the watersheds ; providing necessary infrastructure for adequate financial backup dealing with the necessary socio-economic changes.

In nature, the watershed is covered with vegetation of all kinds and there is a near balance between soil, water and vegetation. However, as the human activities start, the inter-relationship between soil, water and plants goes through radical changes. Therefore, in the development of a watershed, an understanding of processes and factors associated with soil-water-plant relationship is very essential before any effective development is resorted to. On dealing with watershed development, emphasis is on small watersheds and not on river basins.

Soil, water, plant, man and animal are the most important variable natural resources. The integrated management of these resources scientifically on a watershed basis is necessary to maximise production on a sustained basis for the overall development of the area and conservation of the environment. The involvement of the policy makers, scientists developmental agencies and farmers as well, is a pre-requisite for judicious utilisation and scientific management of these resources.

Problems in Resource Management and Conservation

Mismanagement and over-exploitation of natural resources by way of over-ploughing agricultural land, over-grazing grass land and over-cutting of forests have resulted in the problems of degradation of the environment and conservation of resources. About 50 per cent area of our country, including 4 m ha ravines, 7 m ha saline and alkaline land, 7 m ha water-logged land and vast areas suffering from erosion and water shortage, needs soil and water conservation measures. We are losing every year about 1645 thousands million cu. m water, 6000 million tonnes of fertile soil along with 10 million tonnes of

fertilisers and other plant nutrients. The progress of India is linked with agricultural and other biomass production of land which depends on soil-water-plant nutrient relationship. India is a rich country in these resources, but due to lack of conservation practices, we are facing flood, drought, and plant nutrients deficiency and finally poor production every year.

Watershed Management Strategy

The deterioration of natural resources in an area can be contained and the total resources properly developed only by adopting the watershed approach. The basic unit of development is a water-shed which is a manageable hydrological unit. In this approach, development is not confined just to agricultural lands alone, but covers the area, starting from the highest point of the area (ridge line) to the outlet of the nallah or the natural stream. This will involve implementation of ameliorative measures on barren hill slopes, marginal lands, privately owned agricultural lands and badly cut nallahs and river courses. In order to increase production from land and water resources through their optimum utilisation with minimum deterioration, exhaustion and degradation, a large number of development programmes have been initiated in the country under different Five Year Plans. Some of these important programmes which are now advocated to be implemented with an area approach, include :

i) Soil conservation in the catchments of River Valley Projects
ii) Dry land farming
iii) Drought—prone area programme
iv) Reclamation of ravine lands
v) Reclamation of alkali soils
vi) Control of shifting cultivation
vii) Hill area development
viii) Command area development
ix) Integrated soil and moisture conservation in the Himalayan region
x) SFDA, MFAL, Tribal area development
xi) Social forestry and farm forestry
xii) Desert development
xiii) Western ghat integrated development
xiv) Flood control and others.

Concept of Priorities

Some of the above listed programmes are applicable throughout the country and some are problems of specific areas. The physical dimensions of most of these programmes, are on All-India basis, are gigantic and would need very large amount of finances and a large number of well trained technical personnel both of which are in short supply. In some cases, various other inputs and infrastructure required for the programmes are also inadequate. Thus it is necessary to select more responsive areas as per the requirements of each programme. The priority approach provides maximum outturn on per unit inputs or maximum benefits per unit area. It is therefore, necessary to identify priority areas of operations for different programmes which may be in the shape of watershed, specific areas and spots or even administrative units, such as villages, blocks, districts, etc.

Criteria for Priority Identification

The basis for identification of the priorities will be governed by the

objectives, contents and operational details of each development programme. However, in most of the cases basic data and information on following aspects will be required.

a) Physical data such as location, physiography, drainage, soils, vegetation, geology, climate and hydrological characteristics.

b) Present land use, existing stage of development, the nature and extent of problems and their locations.

c) Socio-economic condition, land tenure systems, existing traditions, legislation, bye-laws, etc.

d) Economics of development activities, rates of return, willingness and acceptance of programmes by local population, any impediments to implementation, operational conveniences and difficulties.

To quote some of the specific cases :

1. Areas yielding maximum silt load per unit area need to be identified in the catchment areas of costly dams and reservoirs.

2. For flood control, areas contributing maximum run off are to be determined.

3. Maximum water harvesting possibilities would predominate in the drought prone area programme.

4. Areas having excessive problems of alkalinity with ownership pattern may have to be selected for reclamation programmes.

5. Reclamation of ravines for agriculture will need ravinous areas with maximum area under shallow ravines.

Unit for Priority Delineation

For the selective priority approach, it is necessary to prepare a unit framework for the whole area of operation for a programme. Most of the programmes dealing with soil moisture conservation and land reclamation will require delineation of the area into watersheds of required size. In some cases, administrative units like villages, group of villages block etc. may be more relevant, for example, for reclamation of alkali soils, social / farm forestry, SFDA, MFAL, Tribal area development, etc. Such delineation could be made in a suitable hierarchical system using relevant topo maps, drainage maps, cadestral maps, etc. For identification of priority units, it will be necessary to determine the important criteria and characteristics for each delineated unit. The relevant data would then need to be analysed for classification of the various units into well defined priority categories. Not much experience is available for such an analysis and proper classification of priority categories. A summary of the experience available is given in this paper and on similar lines, the methodology and details need to be developed for different programmes.

Basic Resources Surveys

The following basic resource surveys (bench mark) are conducted and details collected for preparing the master plan of the watersheds.

1. Physiography — shape, size, slope, drainage details etc.

2. Climate — rainfall, evaporation, temperature, wind velocity etc.

3. Detailed soil survey.

4. Land use survey—agriculture, forest, grassland, orchards and their sub-classes.

5. Vegetation survey — natural and planted (grasses, bushes and trees).

6. Hydrological survey — natural water resources.

7. Socio-economic survey — population of man and animal — their present status and requirement.

8. Land capability and irrigability classification.

Master Plan for Integrated Watershed Management

The land use plan should be such which may provide sufficient food, fodder, fuel to the individual and the society as a whole. The important and major activities are described as under :

Erosion control structures : Levelling, contour and field bunding, gully plugging, diversion channel, earthern embankments, ponds and water ways.

Agronomy : Field demonstration on package of practices like fertiliser, tillage, plant protection, mixed cropping etc.

Orchards : Planatation of suitable fruit trees on field bunds or in block.

Forestry : The area under government or village common land is to be covered by suitable forest trees.

Grassland : Suitable grasses were proposed on field bunds, class VIII lands and community lands.

Mixed Cropping : Farm Forestry, Agriculture, fuel-fodder plantation, agri-horticultural system on farmers' fields, their bunds and common lands.

Animal, fishery and poultry : Replacement of poor animals and goats by high yielding cows/buffaloes along with fodder cultivation and fuel-fodder plantation.

Estimates on total cost and benefit and cost benefit ratio

The phasing of expenditure for three years is normally done. The cost benefit ratio is worked out to predict that the plan is economically viable and priorities of different activities are fixed.

Development of Watersheds

The master plan of integrated ORP watershed is to be executed by following State Departments under the control of Deputy Commissioner/Deputy Collector, as Chairman of Project Implementation Committee and Scientists of ICAR Institutes/Agricultural Universities as Members of Scientific consortium :

1. Soil Conservation — Land Improvement, water storage and engineering structures.

2. Agriculture — Crops, varieties, plant protection measures ; crop demonstrations, etc.

3. Forestry — Agro forestry, farm forestry and fuel fodder plantations on Government land, common land, and farmers field.

4. Animal husbandry — Improved breed of cows and buffaloes, fodder and grass production.

5. Minor irrigation — Embankment for water storage, open tube wells.

6. Plant protection.

7. Fisheries/Poultry/Piggery

8. Cottage industries

9. Horticulture

10. Others — sericulture, agriculture, etc.

The State level officers of aforesaid departments are expected to supervise and guide the works and should adopt the ORP Watershed with full enthusiasm. This will ensure the overall development of model watersheds which can be raplicated at other places of the states.

Research Activities in Operational Watersheds

The research data generated out of the watersheds developed and managed under controlled conditions by scientists need their testing in natural conditions to improve their utility and practicability.

B. Research activities

The following data, depending upon their feasibility, will be recorded to monitor the changes in watershed production and environment due to developmental activities.

Instrumentation

Recorders for rainfall, evaporation, temperature, runoff, etc.

Engineering and hydrology

i) Rainfall analysis ii) runoff volume and peak iii) evaporation and seepage losses iv) behaviour of engineering structures v) infiltration vi) ground water re-charge vii) sedimentation in reservoir / stream viii) studies on runoff treated comparable watersheds.

Soil

i) Erosion and sediment losses ii) soil fertility due to change in land use and land shaping iii) soil moisture iv) loss of nutrients as to runoff v) erodibility of soils etc.

Trees (orchard, forestry, agroforestry, etc.)

i) Suitability of trees ii) biomass production iii) growth of trees iv) yield of fodder, fruits, fuel etc., v) canopy vi) lopping studies vii) nursery techniques viii) soil working techniques ix) natural vegetation x) studies of flora xi) problems.

Agronomy

i) Suitability of crops / crop rotation ii) crop yield iii) farmers Vs improved practices iv) lab to land programme evaluation v) minimal irrigation / conservation irrigation vi) disease and pest infection vii) optimization of fertiliser viii) agricultural practices — tillage, mulch and agricultural chemicals ix) problems.

Socio-economic survey

i) Consumption of food, fuel, fodder fruits ii) yield and economics of different land uses iii) total population of man and animal iv) acceptability of technology v) problems.

Role of Integrated Watershed Management

In planning soil conservation programmes, in most instances, community or cooperative action is indispensable. Small farms which are characteristic in our country, do not allow for an individual farmer to have an impact on land. Therefore these have to be tackled on a watershed basis, as a concerted action where all efforts reinforce and complement each other.

The experience at Sukhomajri and other Operational Research Projects of the Institute has shown that the following will have to be considered, in order to make the transfer of soil conservation technology a popular programme.

1. Constitution of the village societies so that the people of the area feel that the programme is theirs.
2. Each member of the village society has an equal share in the common natural resources developed.
3. Granting the annual grass cutting and tree pruning rights from the government wastelands and Panchayat commonlands to the village societies at reasonable rates to ensure not only the revenue of the government institution, but also Panchayat institutions.
4. Entrusting the job of raising nurseries, etc., to the village schools.
5. Development of marketing facilities for the natural resources generated by the village people.

The formation of Watershed Management Boards by the State Government is necessary in halting the further deterioration of land and water resources.

Progress in ORP Watersheds

A few success stories are narrated from the ORP watersheds of the Central Soil and Water Conservation Research and Training Institute, Dehradun (I.C.A.R.).

Sukhomajri (Chandigarh)

The ORP at Sukhomajri village was taken up by the Institute's Research Centre, Chandigarh during 1975 for testing the technological packages for sediment control in the heavily eroded Shiwalik watershed with local peoples active involvement. Water resources were created by constructing three dams during 1976, 1978 and 1980, covering 29 ha of total command area. During the year 1985, one more earthen dam was constructed by the Haryana Forest Dapartment with their own financial resources. Now, 33 ha good agricultural land is in a position to receive supplemental irrigation from the harvested rainwater from 17.5 ha of sloping forest land. This indicates that almost each hectare of denuded forest land is capable of ensuring sustained production from 2 ha of farmland.

All the farmers in the ORP are now sowing improved varieties of crops and adding fertilisers. 36 farming families raised berseem crop in 0.86 ha area. Raising of berseem was not possible before the project was undertaken. Due to the increased availability of fodder, both from catchment and command, the farmers are increasing the number of stall-fed buffaloes in place of goats. This has solved the problem of grazing in the hilly watersheds. Considering gainful employment generation in small forest based industries, efforts were made to start a small forest based

industry and also to start a small essential oil extraction unit at the village by the Haryana Forest Department. 7 farmers have grown 11,000 plants of *Eucalyptus citrdodora* for providing leaves for oil extraction. 3 farmers have grown lemon grass in an area of 0.2 ha for making perfume oil.

The hill resource management society is functioning very effectively; irrigation water distribution is managed by this society. Earlier, the grass from the forest catchments was used to be auctioned to the contractors, but now by approaching the state government, the grass is given to the village society at pre-decided rates. Thus, the villagers are now getting cheaper supplies of forage grass.

Chhajawa (District Kota, Rajasthan)

The execution of works in ORP, Chhajawa was started in the fag end of February, 1986. 6312 running metre graded bunds of 1.5 sq.m cross section in about 80 ha were constructed till 31st March 1986. Seven permanent stone masonry crop spillways and seven semi-permanent (Gabions) structures were constructed in the nala bed for erosion control.

The total catchment area treated with permanent and semi-permanent gully control structures is 170 ha. The bunds have functioned well during the rainy season without even a single breach in the first monsoon season of extraordinary downpour. The drop spillways have trapped lot of silt and functioned well in stabilizing gully beds. There was considerable pondage of water behind the structures resulting in raising of ground water substantially. The water table in the open dug wells was 1.3 to 3.5m below ground level this year (1986) as compared to more than 5m in the same period last year (1985) before construction of structures. The improvement in ground water recharge will help the farmers to irrigate more area under each well.

Six Soyabean and twenty four Sorghum (CSH-5) crop demonstrations were taken on farmers' fields. 3800 tree plants (*Albizzia lebbek, Prosopis chilensis, Acacia nilotica, Pongamia pinnata, Dendrocalamus strictus* and *Date palm (Phoeniz dactylifera)* were planted on nala banks/Govt. wastelands, 120 lemon plants were planted in an agricultural field of 0.4 ha.

G. R. Halli
(District Chitradurga, Karnataka)

Taking advantage of 69 mm of rainfall received during July, 1986, all the 15 demonstration plots were sown during third week of July, '86. During August and September, the rainfall recorded in G.R. Halli watershed was 81 and 151 mm, respectively. Bajra, Castor and Sunflower are good followed by Ragi and Setaria. Subabul has been sown at 10 m spacing in between the crops to intercept the runoff and facilitate in situ moisture conservation. Five brushwood checkdams were constructed during July, 1986 in B and C nala in which 12 stems have already sprouted. A total of 46 plant species covering *Pongamia, Eucalyptus, Zizyphus, Anon etc.* are planted in B nala embankment. 150 horticultural plants consisting of *Phyllanttus emblce* (Amla) *Anona sguamosa* (Sitaphal) *Tamarind* and *Zizyphus* were planted in Class VI marginal lands. Agri-Horti system is being developed to provide stable income during the rainfall deficit years. *Pongamia pinnata, Glyricidia maculate, subabul, castor* and *redgram* were grown on graded bunds

and established well. Out of 1550 Eucalyptus plants planted along the foot-hills and road sides, 94% survival has been noticed with average height of plant being 1 m. Further, 10,000 *Eucalyptus hybrid* 5000 *Dalbergia sissoo* and 5000 *Pongamia pinnata* planted in 5000 contour trenches in Class VII land at 5 m spacing have established well survival of 94 per cent.

Salient Points for Consideration

The delineation of a watershed for immediate use can be made on an *ad hoc* basis, as per the requirement of a programme for the area of operation. Caution to be followed is that the selected area must conform to a watershed. Subsequent survey investigations, collection of basic data, planning and implementation etc. should be carried out strictly for the area falling within the watershed and not on the basis of the villages contained in the watershed or any other administrative unit. The accuracy of watershed boundaries at various stages of delineation is dependent upon the details of drainage given on the available base maps. The boundaries can be corrected and refined with the help of aerial photos as well as during field surveys. Under limited resources for development, selective priority approach is more desirable for obtaining maximum return from a unit input. For priority identification, basic data are required for areas of operation with regard to physical characteristics, present status of development, socio-economic legal and traditional conditions and likely potentialities of response to a development programme. Watershed management principles and practices should be introduced mainly as integral components in rural, agricultural, forestry development, hydropower and irrigation projects. These components have to be implemented and sustained by people other than "Watershed managers" — by general project administrators, foresters, agriculturists, sociologists, hydrologists and most importantly, by farmers and other land users. The implication is that these types of people need to understand why and how watershed management should be incorporated into every day activities. Watershed management must be integrated into the mainstream of development activity. It may be that watershed management practices only need to account for a small part of the budget to be effective. The Watershed management expert may play only a small role in the total project; however, it can be an important one if sustainable development can occur only when the needs of people and the capacity of the natural resource base to meet those needs are balanced over time. Watershed management provides a convenient framework to use in moving towards this balance

Conclusion

Watershed Management Programme is a multi functional, well co-ordinated, integrated programme and has to be well supported with research. The research findings need to be intensively demonstrated and popularised. Success of Watershed management programmes ultimately will depend on the active cooperation and participation of farmers in the watershed, as it is they who have to apply these practices in their own fields to make this endeavour a success.

Acknowledgement

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Use of Geographical Information Systems in the Management of Land Resources

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1. Introduction

1.1 Growing awareness of unsound exploitation

In the last 3 or 4 decades, as a result of the impact of World War II on political systems, technology and trade, there has developed a sharpening of focus on the many, different problems affecting the management of land resources. The more important of these problems, many of which are inter-related in their origins and consequences, are deforestation and overgrazing; excessively rapid utilization of fossil fuels; possible global warming and consequent sea level rise; decrease in yield response in spite of continued use of artificial fertilizers and pesticides; increase in frequency of floods in the rainy season and droughts in the dry season; and the continued lowering of the ground water level. There are also other acute problems which arise from industrial, agricultural and urban pollution of land directly or through pollution of air or water.

1.2 Simultaneous developments in data bases

At the same time, on the credit side, there has been an increase, globally (even though it may not have been so evident in India), in the depth and breadth of information needed to resolve these land resource and environmental problems. Some of the more important components in this veritable information bulge is the widespread uee in the laboratory as well as in the field of aerial photograph interpretation and photogrammetry in studying land forms, land resources and environmental

degradation, and in measuring terrain or landscape features and land use / land cover changes; and coupled with advances in cartographic techniques and printing technology, production of more informative and easier-to-read topography maps of hitherto uncharted and inaccessible regions of the world; greater sophistication and increased accuracy in measuring and predicting climate parameters; renewed understanding and greater appreciation of the role of humus and tilth in soil-water-plant relationships; development and world-wide application of objective and measurable criteria for the identification and classification of soils; a better understanding of soil water balance for application in soil reclamation and in ground water recharge; and finally development of innovative techniques of management for sustainable production of pasture or range and orchard and forestry.

1.3 Satellite imagery : a data explosion

In the last 15 years, on top of this information splurge, there has been a virtual data explosion; this has come about as a result of several orbitting space platforms able to receive from the Earth's surface and transmit to receiving stations on the Earth, reflectances received separately for several bands in blue, green, red, reflective infra red, thermal infra red and microwave regions of the eletromagnetic spectrum. The Earth's surface is scanned in a series of small contiguous units of land nominally less than half a hectare and, in more recent instrumentation, about a tenth of a hectare. The satellite passes over the same parts of the Earth's surface once in 18 days, that is about 20 times each year at a constant sun time. The potential coverage of any given area of the Earth's surface about 20 times in a year by each of several satellites recording the reflectances of pixels (picture elements) less than 1/2 to 1/10 hectare in 4 to 7 distinct spectral bands is indeed an unprecedented data explosion. It opens up unimaginable potentialities for studying a variety of land phenomena with new perspectives such as synoptic viewing of a large area, cyclic change with seasons, the temporal change from year to year and monitoring the impact of disasters.

1.4 Enumeration data and analysis

In addition, a mass of numerical data on demography, land ownership and cultivation patterns, land use/land cover, cropping pattern and yield estimates, water and fertilizer use, livestock numbers and kind, education, employment, etc. at the district, taluk and block levels have been brought out by each decennial census and other enumerations and sample surveys. Based on them a variety of analyses and interpretations by Universities and other research centres in a multitude of research project reports and academic journals.

A unique opportunity has thus been provided by the availability of raw numerical census data, the satellite imagery computer usable tape data, topography maps, aerial photography and many kinds of thematic maps (on soils, forest and range evaluations, surface and ground water, climate, terrain or land forms, land ownership, transport and communications, tourism and wildlife, urban and industrial development plans) for planning the sound management of land resources and environment protection.

1.5 Growing inadequacy of traditional geographical methods

The traditional methods of creating geographical information structures are based on tabulation, processing and plotting of numerical data ; manual methods of map making and map interpretations using transparent overlays to discern patterns and relationships among the various cartographic information bases. These methods are well-known and widely used, but are slow and require much skilled manpower. Yet they have provided a sound information base for all kinds of development work in the past.

With advances in living conditions and changes in ideas on leisure and work, however, these methods are now regarded as tedious and time-consuming the world over. But, more importantly, the shortcomings of the traditional methods were acutely felt in countries where up-to-date geographical interpretations for practical but scientific application in the management of land resources were urgently needed ; these countries had a mass of useful and readily available data in the form of aerial photographs; topography, soil and other maps, and numerical data, but a very small number (in relation to the land resource) of available or potentially trainable skilled manpower needed for the traditional methods of interpretation of these data.

The driving force to seek, develop and perfect a computerised method, however, originated in the more affluent countries with ready access to a large number of accurate and detailed maps and data and faced with situations where speed and accuracy were of utmost importance as in defence preparedness, satellite tracking, superpower-spying on each other's grain production prospects, and mining companies seeking an edge in staking out mineral-rich or oil-rich areas.

With the increasing availability of many different kinds of accurate and detailed data bases, the slow and cumbersome nature of traditional methods of using one-on-one transparent overlays became very evident. The method lacks the flexibility needed to explore the many inter-active phases between the different data bases.

2. Computerised Information System

2.1 Prospects

Geographic Information System is a sub-discipline connecting geographic data structures (graphical as well as numerical) and computer science (computer technology and complex computer oriented mathematical concepts) with planning and policy-oriented decision-making techniques (Chrisman, 1977). A Geographic Information System provides a convenient way of storing map data and producing maps at any selected scale and with any selected theme. But it should not be taken as a mere substitute for a map cabinet for easy storage and retrieval of maps. A geographical information system can be used to produce maps quickly and economically, but the main purpose is to develop statistical analyses and summaries of geographical and numerical data to aid in resources management decisions.

Progress in use of geographical information systems has been slow and circumspect. Prospective users have been wary and cautious because of security, possibility of theft and risk of data

corruption or contamination by deliberate or accidental abuse. The slow process can be attributed to the very large number of data sets (corresponding to the spatial data points) and to the complexity of computational algorithms needed for analysing geographical data. When it is remembered that digital computers have been traditionally developed and used for the algebraic and arithmetical manipulation of data, it will be easy to understand that geographical analysis (ie analysis of any thematic data of points with intrinsic spatial characteristics and spatial relationships) is relatively cumbersome in the normal digital algorithmic environment.

2.2 The magnitude of data points

The magnitude of the number of data points involved in a geographical map for computerised digital storage can be ilustrated with the simple case of a world map drawn to show only the coastal boundary. At a scale of 1:12,000,000 (ie 1 mm. on the map is 12 km. on the ground), a scale at which the coastal boundary gets somewhat generalised, 115,000 coordinates are required. The size of map sheet will be 330 cm by 180 cm. But if a more detailed shape of the important indentations in the coastal boundary were to be shown, as would be needed for any meaningful study, larger maps such as on scale 1:1,000,000 for small land masses and 1:4,000,000 for the larger land masses would be needed. Such maps will require a total of 6,000,000 coordinates and they will take about 16 times the sheet required for the map on scale 1:12,000,000.

For practical studies of regions, such aa for agricultural development or mineral exploration, the smallest cell depicted needs to be a hectare or the smallest interval between points on a grid needs to be 100 m. Then the number of data points for a study area of extent 10,000 sq. km. (a size of the order commonly undertaken in regional or district planning exercises) will be 1,000,000. Such a region would be represented on a map of scale 1:250,000 on a sheet not less than 40 cm by 40 cm. The size of each cell 100 m. by 100 m. will be on the map 0.4 mm. by 0.4 mm. Thus it is evident that regional geographical studies involve data points of the order of 10^6 for an area of 10,000 sq. km.

2.3 Data allocations on a predetermined grid

Data manipulations and simple analyses can be done with the most obvious form of storing geographical data — namely in cells of a predetermined grid. With such a place structured organisation, besides storing, manipulating and presenting spatially organised data, it is easy to get at individual objects one by one and carry out further analysis or computations on it either alone or in combination with its closest neighbours. But it is very difficult to classify groups of objects characterised by a given set of properties which are unrelated to their geographical coordinates. Hence, though there is a savings in storage space, a loss in computational efficiency is sssociated with allocation in a predetermined grid. The loss in computational efficiency assumes greater and greater importance when more and more sets of geographical data bases need to be studied simultaneously to explore the many inter-active phases between them. But for many routine or standardised manipulations of pixel

data as in image enhancement on a given band or as in ratio derivation of reflectance values of pixels on two separate bands, the use of a predetermined grid has been satisfactory.

Consequently, large-scale encoding of mapped thematic data for digital computers has not progressed as fast as studies with statistical data of small areas or manipulations of data sets one by one.

2.4 Independent map encoding on topological terms

For more varied needs in data processing for information such as the average area of land tracts of a given suitability class or subclass or the average distance of such a subclass from nearest road or settlement, or the slope, water availability, crop productivity of a given subclass, it is very difficult to extract the information from cells placed in a predetermined grid system. A different system of storing data may provide easier access to the data for complex computations. Topological concepts, rather elegant mathematical abstractions which define in an extremely relative manner the non-metric properties of polygons, islands and arcs, properties that are not materially affected by change in size or shape, provide the basis for independent map encoding.

A typical land resources geographical data base 50 cm. by 50 cm. may carry 50 to 250 m. of lines as class boundaries, roads, rivers etc. The geographical data provided by such a complex pattern of lines (a curved line is regarded as made up of a sequence of short straight line segments) is characterised by vertices and nodes (points of meeting of two or more straight lines), arcs (vector lines joining nodes), polygons (areas enclosed by arcs and identified by a point on the polygon and linked to other polygons by arcs and nodes) and islands. In view of the large volume of complex data to be encoded in a geographical base, it is highly important to detect and correct encoding errors automatically. The topological method allows the vertices, nodes, arcs, polygons and islands to be uniquely identified. The independent map encoding scheme includes procedures for for editing, internal consistency, checks and compacting whereby unnecessary data are eliminated, duplicate data are deleted and nodes are closed. This serves as final topological error check and verification, and any unresolved errors are indicated. These procedures also create extensively cross-referenced polygon and are files which carry much topological, spatial and measurement data. These steps greatly facilitate data retrieval, manipulation and analysis.

In geographical information processing taken in topological terms, efficiency in speed is achieved but there is a decrease in storage efficiency, as compared to storage in a predetermined grid. Carefully constructed procedures, however, can increase both computationa as well as storage efficiency.

2.5 Dual function — as a data base and as an access to it

Geographic information system seeks to redress an imbalance in the concept of maps as a data base of spatial information and as an access method to that data or information base. This imbalance is very pronounced in countries where spatial data bases have improved tremendously in the last 30 or 40

years; they now have larger, more complete and more accurate maps. But access methods have not changed significantly since Ptolemy's time. With a very large variety of data bases (topography, rainfall, landforms, plant distributions, soils, geology, etc.) now available to a user, the user must have the option of being able to receive specific details from the spatial data / information base. They must be in the form of lists or tables and maps of specified information at specified level of detail.

The system must be able to retrieve relevant and specific answers and not a subset of data mass. It must be able to retrieve more than a simple fact. It must be able to discover complex relationships. In other words, the geographical information system is not intended to be a substitute for a map cabinet, photocopying machine or a gazetter.

3. Use in Land Resources Evaluation

3.1 Role of users

The breakthrough leading to rapid advances in developing the capabilities of handling geographical data may be ascribed to the development of information processing in topological terms in place of the simple, pre-determined grid. The complexities and numerous systems with very suggestive names, however, may be self-defeating if they cannot be understood by potential users.

Geographical information systems can be set up only if there are potential users pushing for them and who will be capable of using the various analyses and verifying their validity. The behaviour of the complex computational algorithms used in the system will need to be examined both in average case analysis as well as in worst case analysis. Since the land is used more intensively in India (average farm size: 1 hectare) than in U.S.A., Canada or even Thailand or Philippines, the level of detail in the maps and census must be commensurate with the land use intensity.

3.2 Procedures for assigning land suitability

The entire operation of assigning land at a point or in some small area to a suitability or capability group can be committed to a computer if the procedure can be completely specified in an objective manner and suitable data supplied Grid overlays are used to identify dominant soil of each square and the computer is then used to assign each square to suitability class of the soil according to the soil survey report. Such a procedure can be used for providing a variety of interpretative maps of soil properties such as fertilizer requirement, crop productivity and tax assessment and other soil ratings for agricultural engineering properties and highways alignment.

These procedures assume that a predetermined model exists with a set of rules to relate soil properties or soil phases to land suitability or capability. The computer will use this to interpret any data set which may be offered even when the answer seems unreasonable. The land evaluator will need to adjust the rules to correct anomalies so that analogous cases yield reasonably similar answers. The computer can be used by the land evaluator to apply multivariate methods to gain a better understanding of the inter-relationships and thereby he can improve his model.

Computer procedures which enable the model to be constantly reviewed can be adopted in the system.

3.3 Selection of criteria in binary form for specific uses

The suitability factors which need to be applied will have to be specified in binary form and may be designed to be exclusionary or inclusionary. In an exclusionary set up, a tract of land must fulfil all the criteria to be considered suitable. In the selection and defining of criteria, if two or more criteria are mutually exclusive, no tract of land would qualify; such a set of criteria provides an insensitive analysis. In an inclusionary formulation, a tract of land will fail to qualify if any one of the criteria applies to it. If the criteria are very severe in an inclusionary analysis then all the areas will fail to qualify and the analysis defeats its purpose. Ordered hierarchical criteria and multiple ordered hierarchical criteria also are devised to determine suitability levels of areas for particular uses. Continuous interval scales and ordinal data also may be converted to classes for use of criteria in suitability assessment. Ten class levels are commonly adequate for each criteria, very rarely twenty.

3.4 Examples

Most information systems actually in use cover small areas or areas with rapidly changing land use or a limited topic of great interest like environment or mining.

The two well known systems, which have been developed to cover the full range of land resources of a large area to provide information for decision making are the Canadian Land Inventory System, and the Resource and Management Information System of the Soil Conservation Service of the U.S. Department of Agriculture.

The Canadian Land Inventory System is perhaps the most well known civilian geographic information system. Canada has an excellent set of maps on Land Capability for Agriculture (based on the USDA system except for its class 5); Land Capability for Forestry; Land Suitability for Recreation; Land Capability for Wildlife; Capability of Freshwater Bodies for Sportfish; Present Land Use Data (in computer storage but not published as maps); Socio-economic Land Classification (again a computer input based on census data); and Agroclimatic Classification (climatic zones significant for crop production). These sets of maps cover about 20,000 map sheets and a typical map carries 50 to 250 m. of class boundaries. It is a large country (9,976,000 sq. km.) with a small population (25,000,000 people) and a definite shortage of available or potentially available skilled manpower. The availability of detailed and accurate maps and census data, the desire for a rational and efficient plan of using their mineral, timber and agricultural resources and the virtual impossibility of undertaking conventional cartographic analysis because of a lack of manpower have led the country to undertake the formidable task of reading and analysing the vast material using G. I. S. The system is based on "a large computer". A simpler system for local regional projects still continues to be the use of tracing paper overlays.

The U.S. Department of Agriculture Soil Conservation Service has developed the Resources and Management Infor-

mation System (RAMIS) for use in research, classification, survey and land evaluation. There are four sub-systems on soil properties, soil classification, soil location and soil performance. These sub-systems are developed separately but are interlinked for obtaining maximum value in soil classification and soil survey as well as in research farm experiments and trials and in land evaluation. The soil performance sub-system is of greatest interest for land resource evaluators and it has been found useful in assessing tree growth and timber production, range production and crop production The existing interpretations on about 50,000 soil phases (which are actively used and understood by soil surveyors, extension agents, tax assessors, farmers, ranchers, foresters and agrochemicals and farm products salesmen) are frequently revised from records on performance and entered. It is an ever continuing process. The future of land evaluation lies in collecting data on production performance, revising interpretations, and storing the revised data in computers for further processing. The usefulness of such interpretation systems will be realised largely because producers and users of such information and computer scientists work together throughout the development of the systems and in their subsequent operation. Entering data with spatial characteristics is a very arduous task.

4. Infrastructural Data Base Requirement For G.I.S.

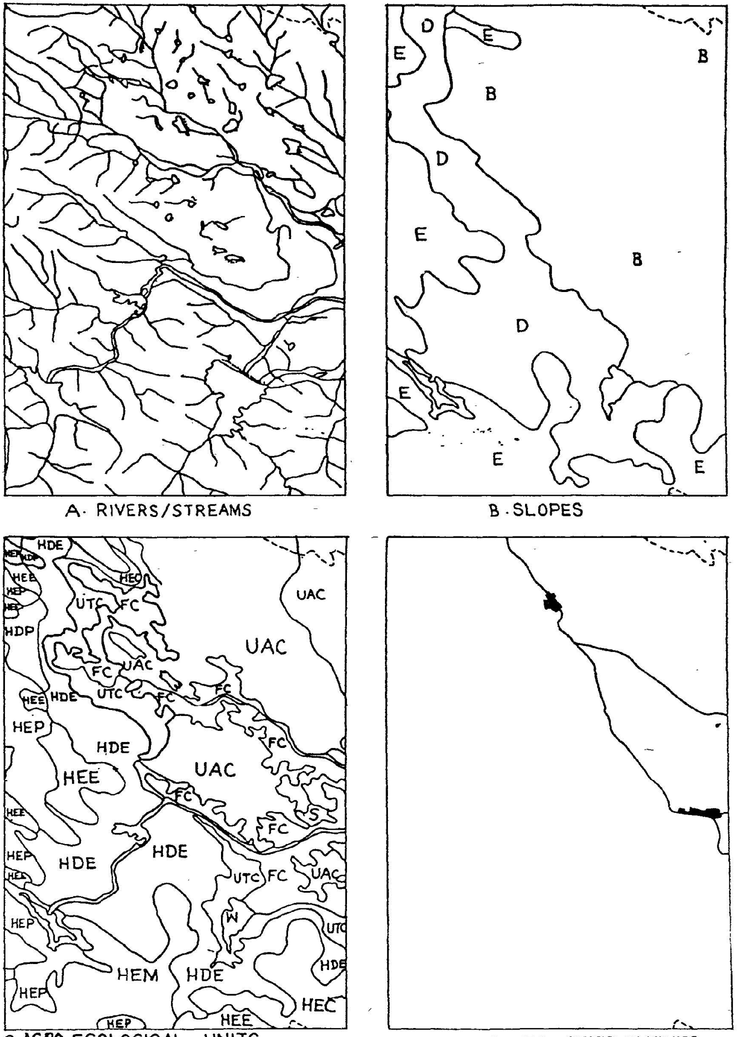
4.1 Importance of quality data inputs

Any proposal to establish a geographical information system presupposes the availability of a sound base of graphical and numerical data at appropriate level of detail and map scale or intensity. Countries like U.K., U.S.A. and Canada have more detailed, accurate and up-to-date maps even though their farm plots are very much larger than the farm plots in India, and the rural population and the rural economy form a much smaller percentage of the respective totals.

The four most important geographical data bases required to establish a useful Geographical Information System for management of land resources are topography maps, aerial photography, soil maps and satellite imagery. While geographical and other data on climate, geology, hydrology, forestry, range lands, livestock, cropping pattern, demography and administration are important, their presentation and understanding need the four geographical data bases listed as the most important. These four data bases will need to be studied and interpreted to provide the relevant information structures which will serve as the main inputs to the geographical Information system. Some examples of such interpretation maps are shown on the following pages to illustrate the complexity of the data involved in any Geographical Information System.

Any Geographical Information System set up without the four infrastructural information bases will be a hollow and wasteful exercise. A venture in this direction without sufficient data presumes an absence or inability to appreciate the importance of appropriate level of detail and map scale for the planning exercise at hand. The fact that in a Geographical Information System computers and electronic printers will give the results needed for planning and policy making can and do lull many into a feeling of satisfaction. Computers are useful in manipulating data and exploring inter-relationships among sets of data bases

1. TRANSITIONAL REGION BETWEEN THE WESTERN GHATS AND EASTERN PLAIN.



A. RIVERS/STREAMS

B. SLOPES

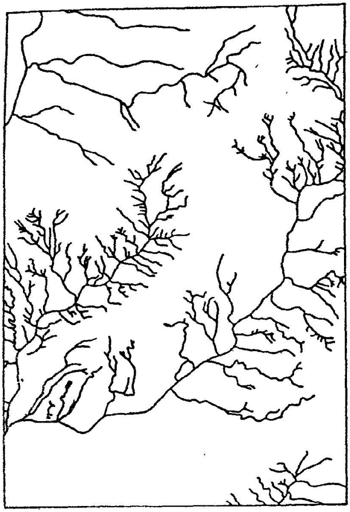
C. AGRO-ECOLOGICAL UNITS

D ROADS, SETTLEMENTS

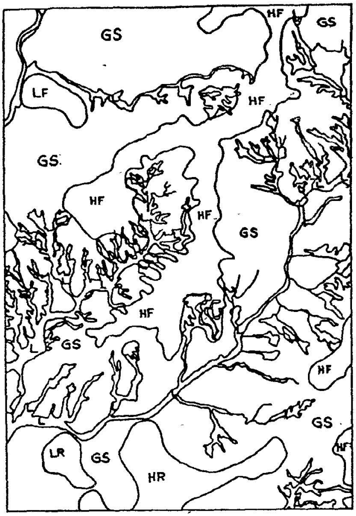
from:
MANAGEMENT OF RENEWABLE RESOURCES
A TN-CST PROJECT
MADRAS INSTITUTE OF DEVELOPMENT STUDIES

0 5 10 15KM

2. ERODED LAND DISTABILISED BY SUB-SURFACE MINING

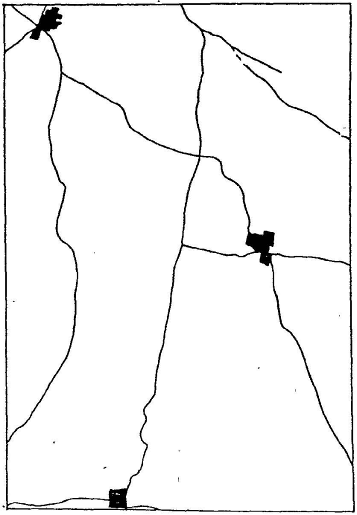


A · RIVERS/STREAMS



B · TERRAIN

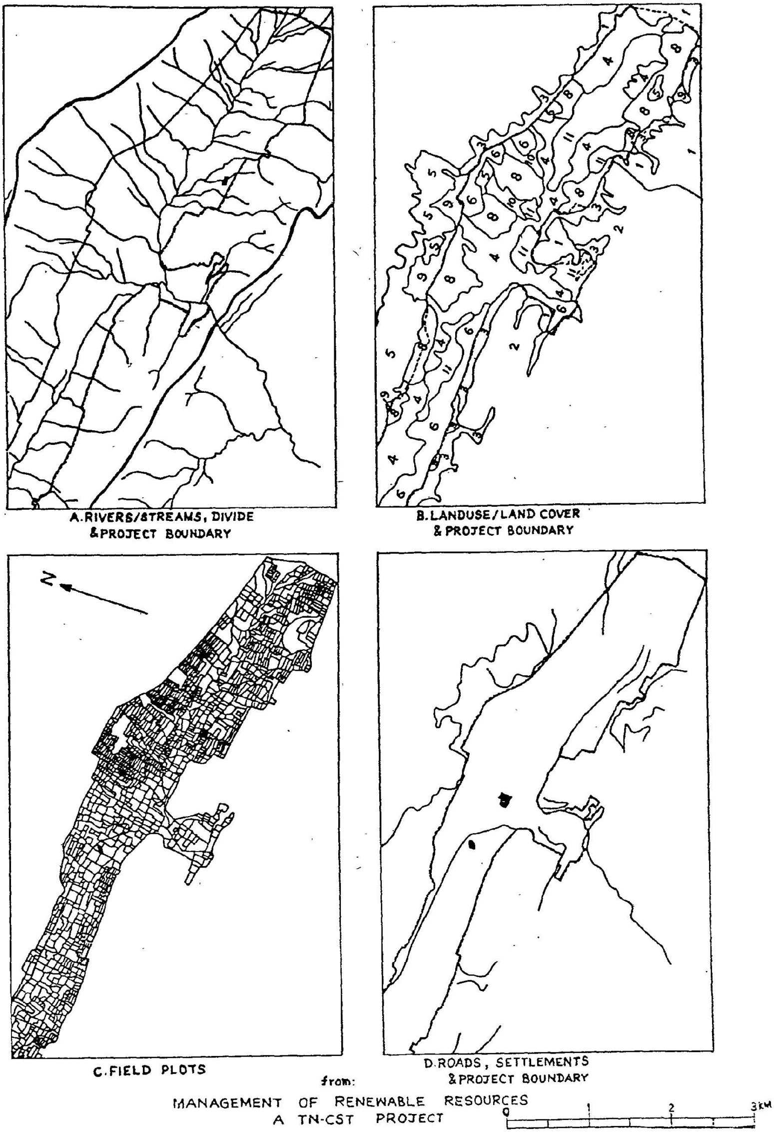
C · EROSION CLASS



D · ROADS, SETTLEMENTS

from:
MANAGEMENT OF RENEWABLE RESOURCES
A TN-CST PROJECT

0 1 2 3KM



A. RIVERS/STREAMS, DIVIDE & PROJECT BOUNDARY

B. LANDUSE/LAND COVER & PROJECT BOUNDARY

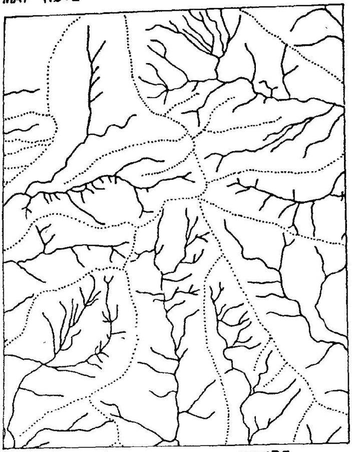
C. FIELD PLOTS

D. ROADS, SETTLEMENTS & PROJECT BOUNDARY

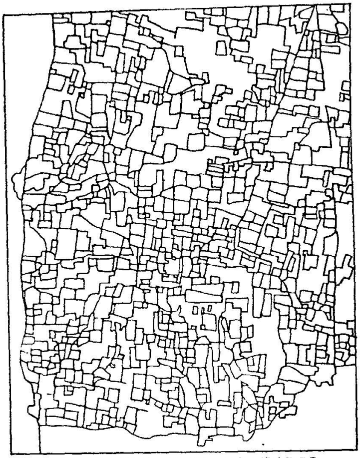
from:

MANAGEMENT OF RENEWABLE RESOURCES
A TN-CST PROJECT

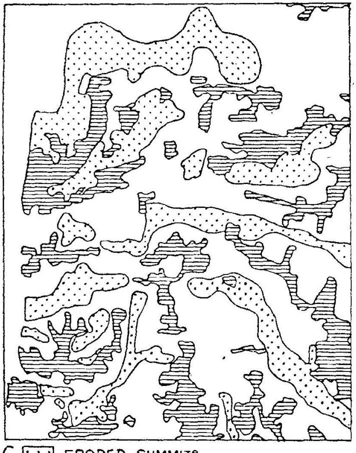
MAP NO: 1



A. RIVER ······ DIVIDE

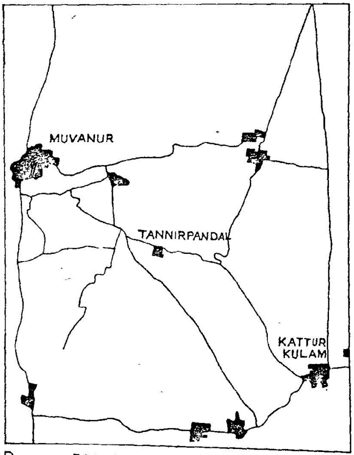


B. MAP SHOWING PLOT BOUNDARIES DISCERNIBLE ON AERIAL PHOTOGRAPHS



C. ERODED SUMMITS

RELATIVELY MOISTER & MORE CULTIVATED LOWLANDS



D — ROADS

SETTLEMENTS

Explanatory Notes for Maps on Preceding Pages

Fig IB : Slope Classes

A : 0—3%

B : 3—8%

C : 8—15%

D : 15—25%

E : 25—40%

F : Over 40%

Fig IC : Agro-Ecological Units

Hilly Region

HEC	E Slopes, Cultivated
HEP	E Slopes, Permanent Tree Cover
HEE	E Slopes, Eroded
HEM	E Slopes, Mixed Cover
HDP	D Slopes, Permanent Cover
HDE	D Slopes, Eroded

Upland Region

UTC	Talus Footslope, Coarse Soil, Cultivated
UAC	Red Brown Soil, Cultivated
FC	Canal Irrigation, Cultivated

Fig 2B : Terrain (Elevation, Slope)

GS	Intermediate Gently Sloping Land
HF	High Flat Land
LF	Low Flat Land
HR	High Rolling Land
LR	Low Rollowing Land
L	Gully

Fig 2C : Erosion Class

1 None

2 Moderate

3 Severe

And Their Combinations in Order of Dominance (ex 1-2, 1-3, 2-3, 3-1)

Fig 3B

Unit	Slope	Present Landuse / Land Cover	Possible Use
1	F	Degraded Forest	ProtectedForest
2	F	Good Forest	Protected Forest
3	C	Moderate Forest	Fuel/Fodder Tree
4	C (Talus)	Moderate Forest	Fruit Trees
5	E,F (Broken Hills)	Open Forest	Protected Forest
6	E,D	Open Forest	Protected Forest
7	C (Talus)	Moderate Cultivation	Fruit Trees
8	B (Valley Fill)	Moderate Cultivation	Crop Cultivation
9	B (Valley Fill)	Good Cultivation	Culttvation
10	C (Valley Fill)	Moderate Cultivation	Fruit T rees or Fuel/Fodder Trees
11	A (Valley Fill)	Cultivation	Cultivation

quickly and accurately. But they cannot make up for inadequate, unreliable or irrelevant data beyond a very limited point. Even that point is determined not by the size or versatility of the computer system but by statistical considerations only; the computer merely serves to use the statistical methods to create "the probability-wise acceptable data" to fill in gaps or to correct or modify the unreliable or irrelevant data.

4.2 Topography maps

The most important kind of maps needed for land resources appraisal are topography maps. They contain in addition to topography (contour lines) a wealth of information such as kinds or classes of tracks, roads, railways, tanks, rivers and canals, including proposed roads, railways and canals ; terrain (besides contours, cliffs, rock features, embankments, coastal sand features) ; mines and burrow pits ; ground water sources (springs, wells, tube wells) ; settlements, religious, administrative and service centres, places of archaeological interest ; navigational aids (if near the coast) ; kinds of vegetation (such as palmyrah and other palms, plantain, conifer, bamboo and other trees, vine, grass, scrub) ; plantations (such as tea, rubber, coffee, cardamoms, pepper) ; forests (reserved and protected) and administrative boundaries.

The topography map is also used as the geographic base for locational reference coordinates. Hence to ensure satisfactory coregistration with other / thematic maps, all maps must have the same kind of projection of curved earth surface on flat paper.

Topography maps on scale 1 : 250,000 are suitable for regional studies and on scales 1 : 50,000 or 1 : 25,000 for project level studies. These maps form the backbone of any development planning and must be up-dated at an interval of not less than 10 years given the rapidly changing current situation. This will require that each year, in each state, 10 per cent of the area is re-surveyed by field surveyors for purposes of updating ; while the old maps of the 10 per cent of the area surveyed the previous year are updated in the cartography office, in addition to preparing photogrammetric data for 10 per cent of the area to be surveyed the following year. Such a programme would be within the capacity of an organisation which had actually produced some of the best topography maps in the world 50 to 90 years ago under very arduous conditions. With modern cartographic techniques and photogrammetry and much pleasanter field conditions, a target of 10 per cent each year does not look unrealistic if the priorities are set for sustainable and sound long term development. Such an effort does not require any foreign exchange but will serve to provide useful employment for young men willing to be trained in field surveying, cartography and photogrammetry.

4.3 Aerial photographs

Aerial photographs have become primary data base for all kinds of land based development. From the early fifties, a large volume of experience under different climatic conditions, terrain and land cover have been accumulated the world over. Simple procedures for preparing controlled mosaics and for transferring interpretation data using simple optical instruments like a sketchmaster have been the basis for assisting field soil surveyors in producing accurate

soil maps the world over. Among others, Srilanka, Jordan, Ghana, Sierra Leone, Kenya, Zambia, Thailand and, to a large extent, Indonesia and Philippines have adopted aerial photograph interpretation as an adjunct to field surveying ; every soil surveyor has been trained in aeriial photograph interpretation and actually uses aerial photographs in the field.

For land resources management, aerial photographs at the scales 1 : 10,000 (for irrigation), 1 : 20,000 (for intensive rainfed agriculture) and 1 : 40,000 (for drier regions) have been found to be generally suitable.

A flexible, responsive and decentralised but centrally monitored and funded system for taking aerial photographs of project areas within reasonable period of request would be one of the most useful institutions for meaningful land resource management and environment protection. Such a system would be also very useful in times of disaster to assess flood damage and drought effects and to make long term constructive plans to minimise the damages of such disasters.

Expertise in the application of aerial photograph interpretation could be more widely disseminated (even at the risk of slight lowering in quality in the initial phases) instead of being concentrated in a few centres of excellence in state capitals and a few district headquarters. Due precautions for prevention of unauthorised use and security clearance especially in coastal or border areas should be part of the dissemination programme. The presently functioning centres of excellence could initiate programmes in training and research in terrain classification, surveying and field correlation.

The quality of aerial photographs should be high not only for photogrammetry but also for aerial photograph interpretation. Attention should be paid to quality of photographic film, exact positioning of the film on focal plane and to the film processing. A flexible, locally based programme of coverage would allow re-flying areas or strips vitiated by cloudiness.

4.4 Soil Maps

Soil maps if properly prepared and described in the map and report provide the most useful body of information for a very wide variety of land resources planning from forestry, range development, rainfed agriculture, irrigated agriculture, highways and airport location to urban development planning. Unfortunately, it is one of the most arduous field jobs requiring qualified and experienced soil surveyors at all times on the spot. An intimate understanding of the terrain is needed. Aerial photograph interpretation prior to field visits and use of a pocket stereoscope with the photo pairs in the field can reduce about 80 per cent of the time and traversing that needs to be undertaken. Frequent inter-disciplinary field discussions with a team comprising a geologist, a hydrogeologist, a botanist, a forester, animal husbandry specialist, and a sociologist or anthropologist and sometimes a medical specialist are also needed. This survey cannot be relegated to a field assistant because mapping decisions have to be made "on the spot" in the field from a study of the landscape and the soils in situ generally in a soil profile (soil pits, road cuts etc). While topography maps the world over have tended to maintain comparable standards of accuracy, clarity and detail appropriate to the map scale, soil maps exhibit a wide range in quality, far in excess of what would be waranted by the complexity and

local perception of which soils are important. Many maps are grossly inaccurate in soil identification, soil boundary, map scale and detail claiming a higher degree of reliability than would be warranted by the intensity of field traverses, sampling method and intensity even when topography base maps and aerial photograph interpretation are used. A good understanding of the system of soil classification (both taxonomic and cartographic) and of the relationships between soil and terrain or topography are very essential. Recognition of plant indicators, relationship with existing land use patterns are useful in many situations.

Soil maps (or for that matter any thematic map) would be most useful if they are drawn on a topography base map as is done in many countries or on an aerial photography mosaic base as is done in the later soil maps in U.S.A. Maps drawn on such a base are more widely used because the user is able to locate himself better on the ground and see for himself the different classes of soils and their relationships with the terrain. This inspires confidence in the maps and will promote actual application of soil maps. When the user is unable to locate the different classes of soils on the land because of a lack of adequate ground features on the map, the soil map is just an unintelligible sheet of paper. It is therefore important that soil maps are drawn on a suitable base map with adequate ground features shown on it. The accuracy of the soil boundaries may be off by 0.5 mm or even 1 mm on a map on scale 1:20,000 in the vicinity of areas with no outstanding feature (for example, in the middle of closely bunded fields, area strewn with many similar rock outcrops or scattered trees). This error will be a distance of 10 to 20 m. on the ground and is allowable. But in an area where the boundary is near a track or stream or isolated rock outcrop or forest boundary which is mappable and therefore shown, the relative location of the boundary with respect to the feature must be correct. Otherwise the user loses confidence in the map. Because of such requirements, there has been a tendency to draw soil maps on a plain base. Such maps are next to useless because there is no way for users to check it or appreciate it ; and are in all probability based on lower quality of mapping by the soil surveyors.

4.5 Satellite imagery

Satellite imagery which from 1972, was actively promoted by EROS data centre in USA has become widely popular after an initial lag period. It has many advantages. The most important is the ability to have a perspective or panorama of large areas to detect phenomena or features that could commonly go undetected in a study of the area with aerial photographs (as in the case of fault lines and other lineaments and gentle domes). The periodic coverage and the ability to provide the imagery in a very short time (a matter of hours or days) to the user can make it very useful in counteracting the spread of plant diseases and in disaster management. They are theoretically also useful in studying land use / land cover and especially cyclic changes with season over the year and also long term trends.

In actual fact, the study of temporal changes appears to be handicapped by the availability of only one or two scenes of any given area in most centres of study. This is only partly due to the fact that for any given scene

area, the number of cloud free days is very small, ranging from 50 in the deserts and Mediterranean climate zone to 20 in the humid, tropical or temperate and equatorial regions. The main reason appears to be the high cost of the imagery. Satellite imagery is extremely useful (as an adjunct to the other three data bases already enumerated) in the study of land resources. It should be regarded not as a "luxury" but as an essential "utility" of inherent value in the development process. If satellite imagery is sold at the cost of making the copy (that is film and processing materials used) or better with a subsidy on those costs, the fullest potential of satellite imagery could be achieved, as is now possible with topography maps.

At the present, only partially corrected (geodetically speaking) imagery are produced. Only prominent features like coast and major rivers appear to have been taken into account in the corrections. The satellite imagery needs to be fully corrected, geodetically speaking, to ensure that there is full correspondence between all the pixels of the imagery and the corresponding areas on a topography base. The projection system used by the Survey of India should be adopted for making fully corrected satellite imagery. If the satellite imagery is based on a superior method of presentation of the globe's surface on flat paper, the concerned agency should also make suitable base maps with the available topography information on the same projection. It is a simple mathematical computerised procedure to change the projections of all the map databases to a single type. All the data bases used in G. I. S. must have good co-registration at the pixel level of detail.

Satellite imagery can be used to greater advantage if the procedures for enhancement are adopted. Some of these procedures are contrast stretch, histogram equalised stretch, band ratioing of a pair of selected bands at a time, principal component enhancements (cluster analysis) using all 4 bands, and edge enhancement.

Until satellite imagery can attain the ground resolution of aerial photographs and provide for stereoscopic viewing like aerial photography, satellite imagery should be considered "as a complementary interpretive tool instead of a replacement for low altitude, large scale aerial photographs". (Lillesand and Kiefer, 1979). There has been a tendency in some quarters to ignore the inherent virtues of aerial photography after the widespread popularisation of satellite imagery. With aerial photographs, the stereoscopic view is exactly (or almost so) as what one would get while travelling in an aeroplane. There is some exaggeration of relief depending on the scale. Just as the light from a given small area of the scene is registered on a single nerve cell in the retina, the radiation from a correspondingly small area of the scene influences a single grain in the photographic emulsion of the film. But in satellite imagery, the view presented is a simulation. This has many potential advantages for interpretation, as already enumerated, because of the electronic, digital computer methods used in the storage, analysis and printing of the basic data. But the fact that it is many steps removed from the real life situation must be remembered at all times for a balanced assessment. For example, the reflectance energy on the pixel purporting to represent an area 56 m. by 79 m. came from an area 79 m. by 79 m. with the same centre and length. Thus there is a built-in blurring

of reflectance energy in one direction (scan direction).

Many important features like railroads though narrower than the pixel size are recognisable if the associated land use / land cover on either side (railway buildings, embankment and associated clearing) has a markedly different reflectance from the region through which the railroad traverses such as a forest or a lake. What is seen due largely to a set of fortuitous circumstances is claimed as an example of the resolution power of the imagery. If the interpretability of the imagery is clearly understood and only genuine capabilities are claimed for it, it is still a very powerful tool to be used in conjunction with the other data bases and that is how it should be looked.

5. Prospects

Geographic Information System is truly a subject in the frontiers of research. Rapid advances in computer aided designing, topological concepts, use of vector and raster data, use of very large number data points or pixels (of the order of $3X10^6$), and in precision and detail (map representation of a pixel being 0.2 mm. by 0.2 mm.) are being made. As a result, very detailed geographic information can be stored as data base and the inter-active phases among the various data bases can be explored.

Storage capacities for manipulating the voluminous information in image data are appearing. For example, to cover the entire land surface of the earth with a data base of images at a resolution of 10 m. by 10 m., 1500 gigabytes of monochrome 8-bit data or 1.5 million scenes of 1,000,000 pixels will be produced. These can be stored on 750 optical storage discs of 2 gigabytes each which could be stacked on racks around the walls of an ordinary office (Aronoff and Jones, 1985).

Nevertheless, the question whether GIS can be useful as an appropriate technology for development projects or whether it will become a white elephant depends on how the different problems concerning "hardware and software requirements; data availability, entry, accuracy and analysis; staff training; institutional environment; and evaluation of results" are resolved (Fox and Chow, 1988).

Apart from the initial cost and maintenance of the computer hardware and the cost of appropriate software, for many studies the availability of physical gnd socio-economic data will be a constraint. This is true for both traditional methods as well as GIS. But a constraint peculiar to GIS has been "the time-consuming task of entering or digitizing the database". As a result of this problem, even p:ojects seeking to establish norms for GIS have resorted to the use of large cell sizes even though the available data could have enabled them to use appropriately smaller cell sizes. As a result, "in spite of large amounts of money and time spent in collecting bio-physical and socio economic data", by choosing to use large cell sizes in order to examine the whole watershed in a short period of time, the type of analysis that could be performed became limited, and some of the questions the project sought to study were unanswerable (Fox and Chow, 1988).

"In many developing countries, draughtsmen are readily available at affordable prices and employing a draughtsmen may be a more sensible solution than acquiring a GIS", even,

in situations where alternative overlays or scoring systems have to be used. The benefits of GIS become evident only when it is necessary to make repeated spatial calculations with many different combinations of overlays or scoring systems (Fox and Chow, 1988).

Under these circumstances, it is very necessary that the four important data bases (topography maps, aerial photography, soil maps and satellite imagery) be developed and used effectively for building up a strong base of physical and socio-economic data for the application of a Geographic Information System for the management of land resources.

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Syndrome of Population Growth and the Question of Common Property Land in a Wet Region: A Case Study of Kosi Embankment Area

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I. Introduction

Common Property Lands (hereafter, CPLs) are the various forms of marginally non-arable village community lands for which no one can have any claim for exclusive individual property right. In village 'patwari' records, these are the various forms of community lands like the village pastures or the 'gauchars', the village forests, river/rivulet banks and beds, village ponds and tanks, swamps and marshes, village panchayat lands etc. These lands are used jointly or individually by the members of the whole village community with or without usage charges. Dr N.S. Jodha of ICRISAT who in 1978 initiated work on CPLs in dry farming areas of Rajasthan and M.P. assumes that the CPLs directly or indirectly play a role in enhancing and stabilising income, employment and sustenance of the deficit households i.e. the landless agricultural labourers, agricultural tenants and the poor peasants in the rural areas. If this is found to be true that the CPLs do have the potentials to provide resources to the village poor, the CPLs are required to be realistically planned as the resource base for the 'target groups' in the rural areas, so that it can reduce the abject poverty, unemployment, alienation and erosion of self-respect caused variously by the landlessness and the drudgery of subsistence cultivation in the villages.

Incidentally, there has been systematic categorisation of land use patterns in the country now but the basic land use statistics do not keep the data separately for the village CPLs though there has been a land use category 'the permanent pastures and other grazing lands' for which there has been the

availability of data. Secondly, the studies which have been done so far regarding the status and use of the CPLs are conducted in the arid and semi-arid regions of the country (Jodha, 1982, 1983, 1984, 1985 and 1986 ; Iyengar, 1989) where because of the low and highly variable rainfall the incidence and intensity of problems relating to CPLs is required to be done in the other agro-climatic regions of the country particularly in the wet farming areas where the importance of hydraulic agriculture cannot be denied and large areas of land are culturable wastelands because of waterlogging leading to swamps and marshes, the latter thus comprise the CPLs at the village level. The CPLs thus seen as constituted of the culturable wastelands and permanent pastures and grazing lands form considerable extent of the total area of our country. Hence it is necessary to evaluate (i) the availability of the CPLs, (ii) the comparative use of the CPLs among the agricultural household classes and (iii) nature of the benefits (if possible by the monetary values) accrued to the village households. The entire exercise may lead to know the traditional poor agricultural households in a better way whose economic, social and cultural behaviours are otherwise hardly understood. Finally, if the nature of the benefits out of the CPLs in the area studied come up to a specific economy practice, the potentiality and challenge of that economy has to be discussed so that the process of natural production get augmented and sustained indefinitely as the ultimate objective.

The area to be studied in the present context is named the Kosi Embankment area, an area essentially contained within the two flood embankments of the Kosi river, downstream of the Kosi Barrage at Hanumannagar, near Indo-Nepal border in north Bihar. These two flood embankments are the En. and Wn. enbankments of the river Kosi to which they parallel and together they have a perimeter of 267.2 Kms, the En. Embankment is 144 Km. long and the Wn 123 Km. The area is delimited on the south by the Manshi-Supaul branch railway line embankment. Measuring an area of 1,435.34 sq. km., this Kosi Embankment Area is subjected to the oscillation and ravages of the (Main) Kosi river and is known as one of the precarious tracts of India, more aptly as 'the River of Sorrow'. But in spite of the fact that this area is carved by the natural imponderabilities and conspicuous as a negative habitat, this riverine tract is densely populated. Socio-economically, it is an area of agrarian society, whose population is one hundred percent rural and is directly descendent on the proceeds from the Mother Earth disposing of very limited, unevenly distributed areas of land. Thus, a large size of population live in abject poverty. It is hoped that a cross sectional analysis of the villages in the area sampled for questionnaire survey would, therefore, allow to find out the nature and extent of the village CPLs which are directly related to the capricious nature of the (Main) Kosi river and the intensity of their uses by the poor agricultural households of the villages.

The paper is organised in five sections now. Section II carries on the discussion on the Kosi Embankment Area initiated in the Section I above in terms of channel dynamics of the (Main) Kosi river now embanked and the resulting human miseries. Section III is devoted to the study of the population syndrome in this 'negative habitat region' through the analysis of the decadal growth function of the villages and decreasing land-man ratios. Section IV discusses the sampling frames and report the

field findings. Section V describes the generalities of the village CPLs and their beneficiaries. The concluding evaluation in terms of scales and perspectives is finally drawn in Section VI which not only present the operational lessons to be learned from the area but also suggest the means for the CPLs to be projected as a subsector of rural economy in view of vulnerability syndrome in Kosi Embankment Area.

II. Channel Dynamics

The Kosi Embankment Area, as defined above, came into existence when in 1963 a barrage across the (Main) Kosi was constructed and the two earthern embankments with 3.66 metre height and top width of 4.5 metre were tied up with the barrage (by the afflux bunds). The primary objective of the barrage is to flatten the steep gradient above the barrage and thus to arrest the coarse silt load downstream so that the river is channelised, its capricities are prevented and the Kosi region of Bihar is saved from the untold miseries to human life. But due to the non-existence of a high capacity storage dam in the upstream for controlling the heavy silt load, this hope is not realised and the channel deviation continued unabated, attacking the two embankments, particularly the eastern, directly in the reaches whereby heavy silt deposition occurs. In the process, the maintenance of the Kosi embankments, particularly of the eastern, has remained a major operation for the Kosi Project Authority (which was established subsequent to the construction of the barrage) every year. To protect the embankments, impermeable 'groynes' have been projected from the embankments into the river side. The groynes deflect the swirling river current away from the river bank, but if the river contains sediments, the region in between the groins is gradually silted up due to slack motion. In between 1963 and 1985, as many as 284 number of impermeable groynes have been constructed, of which 232 are on the eastern embankment and 52 are on the western embankment. Inspite of these elaborate and costly protective measures, there was a breach of 1.5 km. width in the eastern embankment in September 1984, resulting in the wiping out of 43 villages, near Nauhatta where 40,000 hectare of agricultural land turned barren due to deposition of micaceous sands and 100,000 people became homeless. Majumder (1985) concludes that "with the river flow remaining basically unstable, the direction of the flow becomes unpredictable. Meandering of the flow, erosion of river bed and banks, outflanking of the groynes are all due to instability of flows and the flows mostly attack the eastern embankment and thereby threatening the very existence of the eastern embankment".

The Kosi Project Authority carries out 'datum level survey' every year (since 1958) along 92 cross-sectional lines within the embankments across the river Kosi. Out of the 92 cross-sections (which are the lines of azimuth), 32 cross-sections are at upstream of the barrage and the remainings are below the barrage in the Kosi Embankment Area with the last CS No. 92 is at Koparia. The Map I represents this embankment area below the barrage with the CS from 33-A to 92 shown across it. Along these CSs the datum heights are measured every year in the months of December-January at every interval of 600 metres. The data out of this survey helps in studying the changes in channel geometry of the Kosi river. The 15 years of data ranging

from 1958 to 1984 collected from the Kosi Project Authority were analysed for identifying the pools in the first 600 metre distance away from the two embankments : the eastern and the western. Three types of pools were identified from the data on the basis of a criterion established for this purpose, that is, if the difference between the datum and the water level height exceeds 3 metre, it is taken as the primary pool, pl, the pool of the 2nd order is p2 with a depth between 2 to 3 metre and when the depth of the channel is within 1 to 2 metre, it is taken as the pool of the 3rd order, p3. The following Table I gives the tabulation of these three orders of pools identified within 600 metre distance away from the embankments based on the data of the 15 years as well as for the year 1984, the latter is shown separately.

TABLE I

Pool Development Near the Embankments

Pool order (Depth)	No. of Pools near During 15 years	Wn. Embankment in 1984 only	No. of Pools near During 15 years	En. Embankment in 1984 only
p1 (3 metre +)	20	2 (at CS sites 47 and 48)	30	4 (at CS sites : 41,43,77 & 85)
p2 (3—2 metre)	17	I (at CS site : 87)	64	9 (at CS sites : 41,42,46,66, 78,83,84,91, & 92)
p3 (2—1 metre)	18	2 (at CS Sites : 56 and 75)	60	4 (at CS sites: 56,62,65 & 90)

Note : 2—digit number within ( ) indicates position of the pool by the CS site. The position of the pool by the CS site is indicated for the year 1984 only, for the 15 years period the number of the pools are mentioned. The years for which the data were collected from Kosi Project Authority are : 1984, 1982-76, 1971, 1969, 1968, 1965-63 and 1958.

The above Table 1 thus indicates that the river Kosi which was known to have a westward progression in shifting of its channels before the construction of the Kosi barrage has been still doing the same after the construction but with a change in direction from the previous westward direction to the eastward direction now and in the process the river is flowing perilously close to the eastern embankment, particularly from below the CS site No. 40 down-

wards. Thus this entire area inside the embankments is supposed to be a flood channelway of the river Kosi where the migration of the channels can be very swift and abrupt leading to 'channel metamorphoses'. These can be all very disruptive and costly for human activity. Hence in the beginning of the Kosi Project in 1958, the local people were given the compensation and rehabilitation assistance from the government to the extent of Rs. 2.13 crores by 1960s. But the local people have not been able to shake off their attachment to their native villages and carry on their activities within the embankments until the fury of the flood force them to retreat. Thus, the Kosi Embankment Area which is an area of 1,435.34 sq. km. do has a landscape, economy, culture and heritage which is naturally and compulsorily KOSI ORIENTED at every stage even after the twenty seven years of construction of the Kosi barrage.

III. Decadal Growth Function, Decreasing Land-Man Ratios and Population Syndrome

There are about 324 villages within the two embankments of Kosi river. But while delimiting the Kosi Embankment Area, the southern limit was taken at the end of eastern embankment which is again intersected by the North Eastern Railway branch line. In the process, 26 villages of Salkhua block and 1 additional village of Simri Bakhtiarpur block were added. The village-wise map of the Kosi Embankment Area shows the spatial distribution of all these 351 villages. This indicates the villages which are on the embankments (eastern or western) and even have a part of the area outside the embankments. After the construction of the eastern and the western flood embankments in 1958, the villagers living in this area were given 'homestead' land to habitat themselves in places outside these two embankments. Hence villages having either one of these two embankments as one of their alignments or the village areas extending beyond the embankments, have been identified as 'embankment' villages to distinguish them from the 'non-embankment' villages which are totally within the Kosi Embankment Area. This distinction between the embankment and non-embankment villages is done in the context that since the non-embankment villages are officially identified as the floodway area of the Kosi river, it is assumed that the people living in these villages will not be having the same habitat and land use as those practised by the people living in the embankment villages. It is found that out of the total of 351 villages, non-embankment villages are 223 and of the remaining 128 embankment villages, 72 villages are on the eastern and 56 are on the western embankment. It is found that among the embankment villages the size and density of population on the western embankment have been more than those on the eastern embankment. Between the embankment and non-embankment villages, the villages away from the embankments are smaller (330 hect. on average) compared to those of the embankment villages (equal to 560 hect. on average). But demographically the increase in population during the tri-decennial period 1951 — 1981 is more in the villages away from the embankments than those in the embankment villages, e. g. compared to 1951 the growth in population in 1981 in the former was 2.70 times but in the latter it was 1.69 times. Thus, the Kosi Embankment Area serves as a

microcosm of the macro perspective of Bihar and in that way it also reflects the same picture of pervasive vulnerability of the peasantry in Bihar. It appears that though the villages inside the Kosi embankments are declared non-habitat areas, the local people continue to stay in their villages until the river Kosi starts swallowing everything. This behaviour of the people is not due to some 'psychologically mystic affinity' to the land that they used for so long, but because they have no place to move. The local people are pragmatically aware of the fact that uncertainties and risks in this hazard zone of Kosi Embankment Area are no greater than the uncertainties and impossibilities outside the area. The social and economic hazards inherent in the social relations of production is more difficult to handle on the part of a poor peasant. It is this 'objective social space' which keeps the poor peasant within this marginal area.

For carrying on the systematic village surveys for CPLs in the latter part of this paper, the 351 villages of the Kosi Embankment Area are now arranged into five clusters :

(I) **Large Village** with population more than 2000 but area either (Ia) more than 500 hect., or, (Ib) less than 500 hect.

(II) **Medial Village** with population between 1000 to 2000 and area either (IIa) more than 300 hect., or, (IIb) less than 300 hect.,

(III) **Small Village** with population between 500 to 1000 and area either, (IIIa) more than 100 hectares, or, (IIIb) less than 100 hect.,

(IV) **Hamlet** with population less than 500 and area also less than 100 hectare, and

(V) **Non-Habitat Village.** For working out the growth function of the villages in the four census decades of 1951 to 1981, the density of population of the villages is worked out with respect to each of the decades and then seven composite growth indices are adopted. These initialed from 'm' to 's' are as follows :

Constantly High, m — village with increasingly high progression in human occupancy rate since 1951

Constantly High Since 1961, n — villages growing since 1961 as there was a decline in population between 1951-1961

Constantly High Till 1971, o — villages growing till 1971 but since then there was a decline in population in 1981

Fluctuating, p — villages with either high-low-high-low, or, with low-high-low-high/low growth in the past four decades

Constantly Low, q — villages having a declining trend in population. This is an exception al category with only two villages reporting this

Depopulated, r — villages with change of habitat status. In the Kosi Embankment Area, there are instances of the river's occupying a village and the eventual displacement of the people from the village

Unhabitated, s — villages not having any habitat up to the present

Table 2 below gives the information about the size and growth function of villages in the Kosi Embankment Area by site and cluster size.

TABLE 2

Kosi Embankment Villages — Size and Growth Function

Cluster Size (by code Nos I to V)	Total No. of Villages	Composite Growth Function (by small case letters, m to s, see text above)						
		m	n	o	p	q	r	s
I (a)	63(15)	58(12)	2	2(2)	I(I)			
I (b)	22(05)	20(04)	I(I)		I			
II (a)	56(14)	44(09)	4(I)	6(3)	2(I)			
II (b)	38(07)	27(06)	6	I	3(I)		I	
III (a)	68(13)	28(04)	14(3)	2(I)	24(5)			
III (b)	7(01)	6	1(1)					
IV	59(07)	II	4	5(1)	37(6)	2		
V	38(10)						25(7)	13(3)
Total	351(72)	194(35)	32(06)	16(07)	68(14)	02(00)	26(07)	13(03)

Note : The numbers within the brackets indicate the eastern embankment villages.

From the above Table 2, it would appear that function of growth of the villages in the Kosi Embankment Area, is related to the size of the villages. Thus upto the 'medial' size of the villages, the growth in a progression is rather the rule than the fluctuating growth but this becomes opposite for the 'small' and the 'hamlet' categories of the villages, e.g. only 2 and 5 villages reported fluctuating growth, 'p' in the 1951-1981 period among 85 large and 94 medial—size villages against 24 and 37 out of the 75 'small' and 97 'hamlet' villages.

Apart from the size and growth function of the villages, the socio-economic variables particularly the 'attained' characteristics of the population in the villages like literacy, participation in the work force etc. permit the villages to be assigned to a 'type' and this typological classification of the villages identifies the sort of the problem like pauperism, vagrancy and impoverishment of the rural majority in the villages. In these respects, the entire Kosi Embankment Area with 100 percent rural character, an average literacy of 27 per cent male and 5 per cent female, and 93 per cent of male and 97 per cent of female work force in primary occupation of cultivation and agricultural labour, is beset with primitiveness and abject poverty ; the latter are more revealed with the land-man ratios namely, the LCR i. e. the land-cultivator ratio and LMRPO i. e. the land-man ratio by primary occupation. In Table 3 these ratio values are categorised into six 'farm-size classes' and their frequencies are worked out for the villages in the Kosi Embankment Area for 1981 and for 1971.

TABLE III

Villagewise distribution of Land—Man Ratios in Kosi Embankment Area, Years 1981 & 1971

Tenure Status	Farm—Size classes (in hectares)	Kosi Embankment Area, 1981 and 1971 Villages in 1981		Villages in 1971	
		LCR	LMPRO	LCR	LMPRO
Zero / landless Labourers	0.0 to 0.5	61	168	20	93
Marginal Peasants	0.5 to 1.0	112	116	71	150
Poor Peasant	1.0 to 2.0	94	31	122	37
Peasant Farmer	2.0 to 4.0	37	9	58	18
Rich Farmer	4.0 to 10.0	15	2	30	7
Capitalist Landlord	10.0 and more	5	...	23	1
Total No. of Villages Reported :		324	326	324	326
Average Land—Man Ratios per village (in hectare)		1.64	0.66	2.99	1.07

From the above Table 3, it is evident that compared to 1971, the number of villages reported below landholdings of 1.0 hectare have got doubled approximately. This downward shift in the whole structure of landholdings per village is also reflected by its declining size of average landholding per village in 1981. It is to be noted that the land—man ratio by primary occupation, LMPRO in Kosi Embankment Area coincides with that of 0.61 hectare for Bihar and in this way, this completely ruralised tract, where land is the very basis of existence, represents a macrocosm of Bihar.

IV. Sampling Frames and Field Findings of Village Level Survey

Rights of tenure and rights to use land is probably the most basic of human resources. This is more so in the land-economy based society of the Kosi Embankment Area and hence the village common property lands. CPLs which is not having the dimension of tenure may be a meaningless concept apparently. But since the Kosi Embankment Area is a negative habitat zone (due to area's proneness to annual flooding) and the CPLs are found by Jodha (1983) and Iyengar (1989) to be

a function of the productivity potential, so the land productivity of the area being marginal, percentage of CPLs to the total geographical area of the region should not be low. Again, by all these accounts, the variability in the intensity of use of the land in the region, may not be as high as to warrant a complete enumeration. Hence the above scheme of nominal division of the village in the embankment and non-embankment categories (by site) and their final hierarchial placement into four fairly homogenous strata of villages (namely, the large—, medial—, small—size and hamlet villages), it was thought, may form the 'sample design' to provide a reliable estimate of the survey work as is done with complete enumeration. It was also decided that for each of the four strata of the villages, four villages will be selected as samples. Reconnaissance tour was conducted for sampling of the villages in the area regarding their accessibility, availability of 'mauza cadastral maps' etc and it was found that the embankment and the non;embankment categories of vilages (which are not found statistically different in population size) differ in the aspect of investment in crop inputs and usage of the village CPLs. Hence it was also decided that out of the four sample villages in each of the four strata, atleast two villages in each will be from embankment villages. Thus a total of sixteen villages were selected as samples out of the total of 313 villages reporting habitation in all the decades from 1951 to 1981 out of the fourteen blocks forming the region. These sample villages are shown by their location and their code numbers. The Table 4 provides the list of these sample villages by their categories and by strata.

As these 16 sample villages appear to form six clusters (of 2 to 4 villages each) and two single nuclei. The sample villages close to eastern embankment are approachable by road from Kishanpur, Nauhatta and by train from Supaul and Kuchaut railway stations. Similarly, the sample villages which are close to western embankment can be approached by road from Ghanshyampur and by train from Nirmauli railway station.

Village level survey adopted here, primarily seeks to get holistic information of the sample villages about their basic statistics regarding the facilities they are having. their physical setting and its impact on land, landuse and economy. It is presumed while carrying on the survey that the region is carved out of the natural imponderabilities on one hand and of the agrarian society on other hand where the population is directly depends on the proceeds from the land and disposes of very limited, unevenly distributed areas of land. These two factors force the large size of the local people to link their fate with the capriciousness of the Kosi river and thus to keep them normally within the marginal areas for their livelihood. While conducting the village level survey an observation method has been used additionally to support, check and correct the questionnaire responses by staying in the village surveyed and talking to the villagers as well as the 'sarpanch' of the village. In a survey of a cluster of villages namely Chandail, Bijalpur, Bakaur and Nomua of Supaul block, the villagers reported that about two decades ago, there was no flow or the main channel of the Kosi river within two kilometres of Nemua, Bakaut and Bijalpur. They are mentioned that flooding had never affected the village

TABLE 4

Sample Villages by Categories and by Strata
(includes the name of the sample villages)

Categories (by sites)	Strata of the Sample Village by Code: I (Large)	II (Medical)	III (Small)	IV (Hamlet)	Sample Villages by Code & Names
72(05) A(E)	214 223	211 212	351		211 (Bijalpur), 212 (Bakaur), 214 (Neuma) 223 (Kadlipatti) and
56(03) A(W)	61 262	69			351 (Kuchaut) 61 (Narindarpur), 69 (Koudihar Laukahi) and
223(08) B		208 284	244 248 263	92 285 350	262 (Jhagarua) 92 (Begamganj), 208 (Chandail), 244 (Kumhrauli), 248 (Enaetpur), 263 (Danka), 28 (Paranpur) and 350 (Samhar Kala)
	85(04)	94(04)	75(05)	59(03)	

Note : Category A(E) is for villages on eastern embankment, A(W) for those on western embankment and B for non-embankment villages.

I, II, III and IV Columnwise indicate the four strata ; Stratum I is for Large Village, Stratum II is for Medial Village, Stratum III is Small Village and Stratum IV is Hamlet Village.

Row-and Columnwise figures indicate the totals for the respective categories and the Strata ; the figures within the brackets indicate the total for the villages selected as samples.

economy before 1979. In 1967-68, a small 'dhar' of the Kosi river flowed east of Chandail but the river is menacingly flowing now besides these villages with perilous erosional activities like river bank slumping through undercutting by the flowing water during June-September period. It appears that during the high-water stage, the channel water enters with the massive sands of the channel deposits by force. These sand deposits are occasionally topped by stratified silty clay and loam on the river bank. During the subsequent *falling stage when the water pressure* drops, the lateral flowage of the bank material occurs back to the river. This results in a series of subaqueous failures which cause bowl-shaped shears in the finer cohesive material of the river bank. The end results of these are the river bank erosion followed by ėmergence of 'charah' elsewhere leading to the loss of agricultural land at the village level and devastation at the individual family level especially for those to whom land is the prime source of living. During the flood, the water comes even to the 'bhitha' or homestead land of the villagers. The disastrous flood of 1984 breached all the ring bundhs of the villages, reduced the villagers to destitutes and forced them to live on the embankment for considerable period where they built temporary huts with straw. *Since the Kosi* Project came into existence, there has been heavy deposition of sand and silt on the riverside of the embankment which raise the river bed considerably (by 1.5 to 2 metre) than the surrounding area which causes waterlogging in the villages outside the eastern embankment through seepage when the river itself is in high flood and makes the sluices (of the embankment) ineffective even after the rainy season ; thus the country drainage in the areas outside the eastern embankment, in particular, has been parallel to the embankment, instead of draining into the river. Thus in this densely populated, totally agrarian village set up, the perilous impact of river bank erosion, flood and stagnation of water are continuously sliding the local economy to the marginalization and pauperization of the masses. This become evident when the survey at the village level was conducted on the tenure status of the agricultural households in the villages. It has been *found that the percentage of village* households practising agriculture is very high ranging between 90 to 95%. Classification of these cultivator households into tenure status based on the land-holdings they owned and operated was not found possible because of the non-reliable nature of data due to various reasons like the usufructury practices, benami transfers in land, oral tenancy rights etc. common in a feudal agrarian structure. Instead, enquiries were conducted on the basis of self-employment, hiring-in, hiring out status of the agricultural households for farm work in the village. The Table 5 below provides the percentage-wise classification of agricultural households to total village households as well as of their tenurial status with respect to the cluster of the above 4 sample villages.

It is apparent from the Table 5 that bulk of the village agricultural households are lower down in the tenural status operating only small plots or not even that. It is assumed that this group of poor peasant -, marginal - and zero class, of agricultural households depend on the village community lands, CPLs for their sustenance to some extent. This relationship will be examined specifically in the section below now.

TABLE V

Agricultural Households and their Tenural Status
(Percentage distribution)

	Chandail	Bijalpur	Bakaur	Neuma
Agricultural Households to Total Village Households (in percentage)	96	89	91	96
1. Capitalist Landlord Class	0.8	0.8	0.7	0.5
2. Rich Farmer Class	9.8	5.2	4.2	11.9
3. Peasant (or, Family) Farmer Class	18.4	10.0	12.0	8.0
4. Poor Peasant Class	12.0	25.0	21.0	11.6
5. Marginal Farmer Class	20.0	21.0	19.1	20.0
6. Landless Agricultural Labourer (or, Zero) Class	39.0	38.0	43.0	48.0
All Tenure status	100%	100%	100%	100%

V. Generalities of the Village CPLs and their Beneficiaries

The village survey data earlier analyses the hierarchy of farm-size classes of the agricultural households in the sample villages. In section III also, the land-man ratios worked out with reference to all the inhabited villages of the Kosi Embankment Area based on the secondary data sources establish that bulk of the agricultural households in the region are having position lower down the tenure status with a tendency to sliding down further. All these findings lend support to our 'research hypothesis' that the land-poor agricultural households of the villages depend on the village CPLs in pursuing their livelihoods. Hence to justify this research hypothesis, the surveys were conducted on the village CPLs for the 16 sample villages on one hand and household surveys for 10 households in each of the sample villages on the other hand.

In the rural land use parlance, the gross geographical area of a village is equal to the total cultivated land (including current fallows, groves and orchards), land under forest, cultivable wastelands and land not available for cultivation. The 'meuzawari notes' of the block development offices or the 'village level land record' data maintained by village 'patwari' does not clearly differentiate between the common property and the private property lands (i. e. CPLs and PPLs). It should be mentioned that the Kosi Embankment

Area is totally devoid of forest and whatever forestry exists along the embankments/river banks, it is shown under 'land under river' which is a part of the 'land not available for cultivation', LNC. Since majority of the villages in the study area are wetpoint settlements so the individual houses are mostly the foot-tracks, so the land under LNC is mostly the river channel and other water bodies. The Table 6 below provides the land use data of a sample cluster of four villages Chandail, Bijalpur, Bakaur and Nemua under 3 categories of land use namely, net sown area, NSA (i. e., irrigated and unirrigated area) including groves and orchards, land not available for cultivation, LNC (i. e. non-agricultural land) including land under water bodies / rivers and land under cultivable wastes, LCW. The common property lands, CPLs for a village in the forms of river : rivulet banks, their beds, swamps and marshes, village ponds and tanks and village panchayat lands etc. are regarded in the present work as part of the land under cultivable wastes, LCW.

TABLE VI

Profile of Land Use of a Sample Cluster
(Reporting Year : 1984-85)

Name of Sample Village	Area in Hectare						
	Total Net Area	Sown Area, NSA			Land Not Available for Cultivation, LNC		Land Under Cultivable Wastes LCW
(Col. 1)	(Col. 2)	(Col. 3)	(Col. 4)	(Col. 5)	(Col. 6)	(Col. 7)	(Col. 8)
Chandail	436	113.8	16.1		20.3	83.21	202.6
Bijalpur	185	113.6	20.5		32.6	2.06	16.2
Bakaur	276	213.5	16.2		11.4	0.89	31.0
Nemua	223	144.7	3.1	202	19.6	28.3	25.1

Col. 3 is irrigated and unirrigated area ; Col. 4 is land under current fallows ;

Col. 5 land under groves & orchards ; Col. 6 non-agricultural land ; Col. 7 land under water bodies / rivers and Col. 8 is LCW, taken as village common property lands, CPLs.

Source of the data : Block Development Office, Supaul ; district Saharsha.

A Comparison of this above land use data with reference to the land use data in 1981 census reveals a wide divergence, e. g. NSA reported for the villages Chandail, Bijalpur, Bakaur and Nemua were 420, 179, 268 and 170 hectares (i. e., 96, 97, 98 and 76 per cent) as against 30,72.84 and 66 per cent in 1984-85 as per the Table 6 above. This indicates that the Kosi Embankment Area being a floodway of the river Kosi, land use in the villages of the area are subjected to a continuous field of tension in their form and extent by the fluvial processes, bringing a year-to-year change in the land use.

To make a comparable study of changes in the three major categories of land use viz, NSA, LNC, LCW (or, CPLs) the land use data of 1981 census is compared with that of the 1971 census (as given in the Village Directory of the respective census). For this purpose, the areas recorded under LNC and LCW (or CPLs) are converted to their percentages with respect to the total area of the villages. Next, these percentage distributions under these two categories of land uses are arranged at every interval of 10 per cent within the range of 0 to 100. Finally, the frequency of the villages in these class intervals are counted ; similarly, the frequency distribution of LNC and LCW (CPLs) for the 16 sample villages with respect the total area is also worked out and the Table 7 below provides the summary of all these three sets of frequency distributions.

TABLE 7

Frequency Distribution of 351 Villages in Kosi Embankment Area Per Extent of LNC and LCW (CPLs) to the Total Area

Percentage to the Total Village Area	No. of Villages LNC (LCW or CPLs)	No. of Villages LNC (LCW or CPLs)	No. of Villages LNC (LCW or CPLs)
	1	2	3
0 to 10	78 (259)	124 (260)	4 (6)
10 to 20	67 (50)	94 (53)	3 (7)
20 to 30	55 (28)	52 (14)	4 (2)
30 to 40	33 (18)	33 (10)	3 (1)
40 to 50	25 (1)	17 (8)	1 (—)
50 to 60	17 (4)	9 (2)	1 (—)
60 to 70	19 (1)	9 (2)	
70 to 80	20 (—)	7 (2)	
80 to 90	16 (—)	4 (—)	
90 and more	21 (—)	2 (—)	
Total	351 (351)	351 (351)	16 (16)

Note : 1 and 2 indicate the data for 351 villages of the Kosi Embankment as per the Village Director of the 1981 and 1971 Census respectively ; 3 indicates the data collected for the 16 sample villages with respect to the data collected in 1985-86.

The frequency data of the villages is given for LNC first, being followed by that for LCW or CPLs within brackets.

The above data for LNC in particular, indicates considerable dispersion in 1981 compared to 1971 but a statistical test would reveal no significant differences though the mean for LNC of the 351 villages was higher in 1981 (34.40 percent of the total area of the villages) than in 1971 (21.04 per cent). Compared to LNC, the land under culturable wastes, LCW is small, only around 10 per cent of the total area. Year to year variation in LCW is also small. Surprisingly, though the mean of the LCWs is higher for the sample villages than that of the 351 villages in 1981 and 1971. The standard error is less and the differences between the LNC and LCW, (or CPLs) are not found significant in the t-test for the samples (Table 8).

TABLE 8

Statistical Tests of Significance for LNC and LCW/CPLs*

	Census Data 1981 LNC (LCW/CPLs)	Census Data 1971 LNC (LCW/CPLs)	Sample Data 1984-85 LNC (LCW/CPLs)
No. of Villages	351 (351)	351 (351)	16 (16)
Mean	34.40 (9.56)	21.04 (10.10)	23.12 (13.75)
Standard Error	27.63 (9.44)	19.08 (11.39)	15.16 (8.85)

Note: The above figures for Mean and Standard Error are in percentages.
*Source of Data : Table 7.

In view of the small percentage of the LCW/CPLs in the total area of the villages, the scope for putting the benefits from their usage may seem to be limited, but since this riverine tract is shredded by the myriads of the channels of Kosi, they exercise an ambivalent impact upon the landuse and the socio-economic life of the people in the area. In the northern part of the Kosi Embankment Area, Kosi has left behind large stretches of sandy expenses i.e., the 'ramnah'. Though these elongated sandy tracts are mostly minorous sands but due to annual rainfall of more than 150 cm. and ample supply of soil moisture, they are infested with weeds 'pater, and 'kans', i.e., a variety of tall reedy grass of 2.5 fo 3 metre height. Reclamation of these areas have been carried out since long but this land once reclaimed if it is not put to any use the growth of this weed is so rank and rapid, that they crop out again. This pater-infested land, in form of LCW/CPLs constitute large areas about 30% of the total area, in the sample villages like Narindarpur, K. Laukani etc. Game hunting for the wild animals, job in reclamation work and grazing of buffaloes and cattle

in the reclaimed areas provide the scope of earning for the local landless people.

The sand particles become finer as the river Kosi passes from north to south so that in the sample villages south of Mahishi block, the sand deposits resemble sandy loam but again because of the ambivalent effect of the river, these lowland tracts, 'dhanhar' are subjected to flooding by the river that surges over these tracts and because of lack of drainage they remain waterlogged and marshy. Mention can be made of the large marshy tracts in the sample village Kuchaut where about 16 per cent of the total village area remains waterlogged. In these areas cultivation is possible for floating paddy and that also by boat. Otherwise, a kind of grass, 'Karami' grows which have long roots and it floats on water. These are cut by the local people by boat and they feed it to their cattle. Fishing and the use of 'karami' as the green forage for the cattle provide the economy to eke out a living for the people whose lands have been lost to the river erosion and they claim these lands as their own.

Seepage from the embankment during the high water level in the river has been the primary cause of waterlogging in the embankment villages, particularly on the outer side of the eastern embankment. In large areas all along the eastern embankment drainage remains impeded where depth of water varies from 0.9m to 3.0m. Harvesting of paddy or cutting of 'karami' by boat, practice of some 'flood recession' agriculture raised as late as in May-June, 'bhadai' crop in March, 'garma' crop in the next year, or, fishing are the usual scenes of economy in these waterlogged areas. In areas where waterlogging is in some lowlying pockets like 'dhars' they remain as the permanent waterbodies, not available for cultivation.

The river banks and the 'charahs' in the Kosi Embankment Area provide the appearence of great grasslands, 'Pampas' of the Savannahs. In this region, the wet environment provides the sandy tracts a very thin velvety cover of small annual grass species which serves as forage for the cattle. This biomass increases to its peak value in the flowering season of September to October. Thus the annual rainfall of more than 150 cm, a high ground water table and a short dry season make possible not only the standing crops in the cultivated fields all the year round but also convert the sandy tracts lying as culturable waste, into green pasture for grazing of cattle, the latter provides as important linkages in economy between the agricultural households practising animal husbandry and the village CPLs of the Kosi Embankment Area. This is more so because in this densely populated tract (e. g., in the two sample villages Nemua and Danka the population density per sq. kilometre is more than 900), every available piece of land has been put to crop land and even the village mango groves which earlier served as the principal scene of village pasture land on collective basis, has been put to growth of paddy. Thus the sandy tracts, river banks and even the roadsides and embankments are intensely used by cattlegrazers from the villages far and away for their livestock.

Regarding the benefits accrued from the village CPLs we require to approach the users for which a total of 160 household samples were taken on the basis of 10 households per sample village. Since the link between the village CPLs and the agricultural households of the villages was not found

to be independent of landholdings of the households, so 80 sample households were taken from the zero/landless agricultural labourer class, 40 from the marginal peasant class, 20 from poor peasant class, 10 from the peasant farmer, 6 from rich farmer and 4 from landlord class.

The zero/landless agricultural people are those who are found to be having homestead land (55 per cent) or not having homestead land (45 per cent) but not in control of any arable land. The only resource they are having is to sell their labour as agricultural labourers ; few are having livestock (2/3 milch cattle/buffaloes, 35 per cent of the total). To supplement their income, those who are having cattle, take their livestock to the village CPLs (there is no common pastureland in the villages : in general the riverbank, roadside, embankment, harvested land of the village serve for the common pasture). Those who are not having livestock on their own, collect the natural produces of the CPLs by hunting animals, collecting fuelwood, thatching materials for petty trade. The green forage is also collected as fodder for the livestock. The sample households in this class live the very vegetative level of scratching and collecting from the mother earth to keep their body and soul together.

The agricultural households in the marginal peasant class have few means of production like arable land not more than 1.0 hect. and a few pair of draught/milch cattle which they graze on CPLs in or outside the village for fodder and/or may take land in share cropping for farming activities, all by their labour. They also live below the poverty level (annual household income of Rs. 3500 for a household of five members was taken as the threshold value for determining the poverty level in the survey) but as compared to the landless agricultural labour households, they are less subject to the socio-economic frictional forces and their degree of dependence on CPLs is also less.

The poor peasant household class people are having 2 to 4 hectares of land mostly having monocrop and a few more draught and/or milch cattle which they may require to graze in the CPLs in or away from the village by their younger family members. They may take land in share cropping for farming activities not all by their labour since they may hire in people for farm work when they themselves be busy in others' farm work or in animal husbandry since their livestock wealth (in case, the household belongs to the caste of milkman, 'ahir') may play a crucial role in giving a good sustenance. This class may live marginally close to the poverty level (i.e. Rs. 3500 annual household income) above or below depending on the support that they get from animal husbandry.

With 4 to 10 hectares of land, the peasant farmer class do not hire out themselves for sharecropping work in others farm, rather they cultivate their land with their own family members. If they lease in others' land, they go for hiring in labour. They may be having draught power but if they are not 'ahir' by caste, they do not go for combining farming with animal husbandry. Thus their dependence on village CPLs is the least compared to three other groups of households described above.

The rich farmer household group and the landlord group : though very few in the village household size, both possess sufficient land as well as the

reasonable to sufficient moneypower not only to hire labour class for farming on their own land and land taken on rent but also to take their large herd of cattle for grazing in the village CPLs The rich landlord class differ from the rich farmer class in having plenty of land under their 'khasmahal' in legal or 'benami' way ; this class never cultivate their own farmland but supervise on their hired-in-labourers for work in farms, cattlesheds, village trade or in their households. They may be 'usurer' and they may get themselves involved in usage of the CPLs of the village or, outside the village by taking them on short / annual / long term lease for fishing or taking contract from government for reclamation of reed infosted CPLs. Thus these two classes are the beneficiaries of the village CPLs through large scale indirect use of them by their money-or hired in labour-power.

Thus from the above household survey, it is evident that because of the intense land-man ratio, the specific categories of the village CPLs are having a number of users across all the agricultural household classes. The green forage provided by the river banks / embankments / roadsides / wetlands are the common attraction for their usage by practically all the household classes. But the village ponds or the wetlands or the derelict river channels wherever the pisiculture is possible, the peasant farmer or the landlord class of the village take the control of the area on lease for their exclusive use over a period of time and the land loses the 'common' status for the period. Thus this type of land attribute alternate between use as CPL and as private land, PL. Except the fishstocks, the village CPLs rarely carry any landesque capital. Their use is essentially extensive rather than site-specific so that an increase in use readily affects the whole natural resources the village CPLs, for example, the stocking rate of a village common pasture may get degraded. The latter happens, particularly, when the village landlord decides to put all his large herd of bulls and the he-buffaloes which work in the cultivated land to feed on the village CPLs.

VI. Opernational Lessons and the need for Village CPLs to be Developed as Subsector of Rural Economy

Finally while summing up now, we can recall that a village CPL is an open marginally usable land which may be put to individual use at a time but it cannot be individually possessed like private land, PL for exclusive use by individuals. This implies that the village CPLs may have a number of users who have independent rights of use but the users may constitute a collectivity and together may exclude others from use of the CPLs who are not the member of the collectivity. According to Blaikie & Brookefield (1987), a village CPL can be distinguished from pure public goods which like a street lamp can be collectively consumed but are not subject to exclusion of use outside the collectivity, since the rate of consumption is independent of the users. It is found that there is presently little control of the village panchayats over the use of the village CPLs. But with the set up of the National Wasteland Development Board (NWDP) in 1984, thrust has now been given to the marginally usable lands including the village CPLs. The survey of the village CPLs in the Kosi Embankment Area shows that out of the 80 landless agricultural households sampled for survey, a majority of them

own 2 to 3 buffaloes/cows and they rear their livestock on the CPLs in a traditional pasture-based system with minimum stall feeding which enable them to eke out a living. Hence until there is a collective control by these land-poor people of the village over the CPLs for development, there can be overgrazing leading to a vicious cycle of increasing impoverishment (of animals) and further ecological marginalisation in economic use of the CPLs. For ascertaining the area needed for the village pastures in the Kosi Embankment Area it was found that there has been a high soil moisture throughout the area so wherever the village CPLs have some percentages of clay, grasses grow luxuriantly and it has been estimated that average herbage production is fairly high varying from one qunital in the north to three or even eight qunitals of hay/per hectare/per year. So if the harvested grass is sold at Re. 1 per kg., the forage resource per hectare of village CPLs (where grasses grow) comes to around Rs. 1000 at minimum to Rs. 3000 (and even to Rs. 9000) at maximum annually. If it is assumed that the requirement of herbage and dry fodder per animal cattle unit, ACU (for an animal of 300 Kg. of liveweight) in a year is 2600 Kg., the animal supporting capacity per 100 hectares of village CPLs is estimated to range from 40 animals at minimum to about 100 to 250 at maximum. But since the resilience capacity of the CPLs is always low, so once a collective control is entrusted to the control, use and development of a specific lot of area in the village, there should be a sound policy of monitoring its use by introducing improved variety of grasses, rotational grazing and fencing too. NWDB can arrange the required financing in the initial stages through the village panchayats over a number of years initially until the local controlling body becomes viable on its own.

In villages where there has been no 'common village pasture' land for collective use of the livestock of the village but the same village is having some landesque capital in form of some water frontage (like village pond, river bank etc.) for possible pisiculture, the land should be given on lease to a group of landless poor people of the village rather than to the rich peasant or the landlord family of the village and a similar policy of monitoring and financing by the NWDB should be carried out until the unit becomes financially viable.

The survey of the village CPLs in the Kosi Embankment Area provides an unique reason as to why the village CPLs in most cases do not get necessarily form part of the public domain. The hydraulic riverbank erosion when it gets associated with high water flow, cause wide-spread damage in the villages close to the river by uprooting the people from their original abode and their private land, PL. Those uprooted people lay claim to any land when it emerges close to their land lost. Another reason for non-availability of CPLs in a village in form of village pasture land is the intense pressure on land due to practically non-existence of any activity other than agriculture in the region; this has led to the peasant poverty to such an abject level in the entire area that the village orchards which are marginally cultivable land in ecological sense are converted to cultivation. In this process of social allocation of space (by the process of conversion of marginal lands like village orchards etc. to privatization), the land-poor people remain marginalised within the new relations of production. Hence effective interven-

tions on the part of the government, the NWDB and the village panchayat are needed so that in the name of poverty alleviation programmes, distribution of CPLs do not further take place for cultivation and ensuring privatisation and they are not leased to the individuals (to get legalised in 'benami' subsequently) so that further decline in the CPLs by area is not only controlled but also restorative measures are taken to sustain the resilience and sensitivity of the biome of the CPLs. All these measures require a change in the social context of the users of the CPLs.

Thus summing up, the quantitative decline in area of the CPLs in the villages of the Kosi Embankment Area is an established fact. Contrary to the vast areas of CPLs (to the total area) in the semiarid region of Rajasthan (which according to Jodha, 1984 ranges from 12 to 20 per cent), the CPLs in well-watered areas of the former forms a meagre 9.56 per cent of the total area in 1981 from 10.10 per cent in 1971. However, this decline in area does not necessarily lead to the degradation of the CPLs thanks to the resilience capacity of the CPLs in the Kosi Embankment Area where the wet eco-climate is capable of providing year-round green forage to the livestock in case the common pasture land is having at least a thin layer of clay in its sandy wastes. But wherever the land does have any landesque capital, the land losses its 'common status' through semi-legal lease and this and other ways of privatization of CPLs for the benefit of few rich people becomes deleterious for the land-poor people. Even when with the well intention of giving land to the landless agricultural labourers, the CPLs are privatised, efforts to use the land by 'substantiability only' leads to the land's further marginalisation thus starting a vicious cycle between the land and its 'new owner'.

Thus, a comprehensive rural development programme is required for a well-intentioned effort to develop the poorest quality land that is the village CPLs by a package of mutually balancing programmes so that the CPLs are put to proper upkeeping for well-being of the least-prepared, land-poor rural people. Improved husbandry practices in form of fodder development in the CPLs institutional credit facilities for the livestock owners, genetic improvement of the stock alongwith the upkeeping of the CPLs can involve the masses in ameliorating themselves. Finally, as the schematic presentation has shown if the CPLs should not have any deleterious effect on the people, the onsite strategies are required to be applied for improved management of the CPLs. For this, following Atchinson and Hughes (1988), it can be reiterated that 'the CPLs should be more clearly drawn into the public domain and in particular by granting a legal right of access to all commons'.

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